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VOLUME I

RCRA FACILITY INVESTIGATION REPORT
TEXAS SOLID WASTE
MANAGEMENT UNITS
FORT BLISS
EL PASO, TEXAS

Prepared for:

U.S. ARMY CORPS OF ENGINEERS
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LIST OF ACRONYMS

ASTM	American Society for Testing Materials
BAA	Biggs Army Airfield
BLM	Bureau of Land Management
BNAs	bas/neutral/acid extractible compounds
°C	degrees centigrade
CERCLA	Comprehensive Environmental Response, Compensation, and liability Act
CFR	Code of Federal Regulations
cm^2	square centimeters
CMS	corrective measures study
DOA	Department of Argiculture
EP	Extraction Procedure
EPA	(U.S.) Environmental Protection Agency
ESE	Environmnetal Science & Engineering, Inc.
°F	degrees Farenheit
FID	flame ionization detection instrument
FS	feasibility study
ft	feet, foot
ft^2	square feet
ft-msl	feet above mean sea level
ft-sec	feet per second
gpd/ft	gallons per day/per foot
gpm	gallons per minute
in	inch, inches
m	meters
mg/l	milligrams per liter
MSL	Mean Sea Level
NCO	Non-Commissioned Officer
NIPDWR	National Interim Primary Drinking Water Regulations

LIST OF ACRONYMS

NSDWR	National Seconday Drinking Water Regulations
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzer
PA/SI	Preliminary Assessment/Site Inspection
PCBs	polychlorinated biphenyls
PE	Professional Engineer
PG	Professional Geologist
PID	photoionization detection instrument
ppb	parts per billion
ppe	personal protective equipment
ppm	parts per million
QA	Quality Assurance
QCP	Quality Control Plan
RCRA	Resource Convervation Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	Remedial Investigation
SCS	Soil Conservation Service
SOP	Standard Operating Procedures
SPT	Standard penetration test
SSO	Site Safety Officer
SSHP	Site Safety and Health Plan
Sq ft	square feet
SWMU	solid waste management unit
TRPH	total recoverable petroleum hydrocarbons
USACE	U.S. Army Corps of Engineers

LIST OF ACRONYMS

USAEHA	U.S. Army Environmental Hygiene Agency
VOCs	volatile organic compounds
WBAMC	William Beaumont Army Medical Center
WSMR	White Sands Missile Range

1.0 INTRODUCTION

Environmental Science & Engineering (ESE) (formerly Hunter/ESE), has prepared this report to describe the activities which were performed during the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) of solid waste management units (SWMUs) at the Fort Bliss Army facility located in El Paso, Texas. This report is only concerned with the eleven SWMUs that are located in Texas (1, 3, 4, 15, 30, 31, 32, 39, 45, 50 and 63). The RFI report for the SWMUs in New Mexico was submitted under separate cover in September of 1991. This RFI report was prepared at the request of the Kansas City District, U.S. Army Corps of Engineers (USACE) under Delivery Order No. 002 of Contract No. DACA41-89-D0122. ESE is a subcontractor to Dames & Moore on this contract. The Work Plan, Architect-Engineer Site Safety and Health Plan (SSHP), and the Site-Specific Quality Control Plan (QCP) for the RFI were previously prepared by ESE for the Kansas City District, USACE, under Delivery Order No. 15 of Contract No. DACW-87-D-0151. ESE was the prime contractor on this contract.

1.1 REPORT ORGANIZATION

Section 1.0 contains a brief description of the RCRA corrective action requirements which apply to this facility and a summary of the Fort Bliss Interim Final RCRA Facility Assessment (RFA) which was previously prepared by USEPA Region VI. The remainder of Section 1.0 describes the location and environmental setting for the Fort Bliss facility, and the regional and local hydrogeology and geology, water quality, and soils. Section 2.0 discusses investigative procedures, health and safety procedures, sampling procedures, QA/QC sample preparation, and decontamination procedures. Section 3.0 provides a detailed description of the site investigations conducted at each of the SWMUs. The analytical results are discussed in Section 4.0. Conclusions based

on comparisons of analytical data to proposed RCRA Corrective Measure Study (CMS) action levels for soils and water are provided in Section 5.0.

1.2 SUMMARY OF RCRA CORRECTIVE ACTION

The RCRA corrective action requirements which apply to this facility are provided in Section 3004(u) of RCRA as amended by the Hazardous and Solid Waste Amendments of 1984. Section 3004(u) requires that hazardous waste treatment, storage, or disposal facilities seeking a permit after November 8, 1984, are required to address in the permit application corrective action for all releases of hazardous waste or hazardous constituents from SWMUs at the facility. This includes inactive and active units at the facility, regardless of the time at which the waste entered the unit. The U.S. Environmental Protection Agency (EPA) is only authorized to issue a RCRA permit if the facility is in compliance with the provisions of RCRA Section 3004(u), or if the permit contains a corrective action compliance schedule. The corrective action requirements under RCRA are codified in Title 40 of the Code of Federal Regulations (CFR), Part 264.101.

The RCRA corrective action process can include as many as six discrete steps. First, an RFA is usually performed by a federal agency to identify SWMUs at the facility and to estimate the potential for releases of hazardous wastes or constituents from the SWMUs. The RFA will identify those SWMUs which may require further investigation in the subsequent steps of the corrective action process. The RFA typically includes detailed literature searches and a site investigation, but normally does not include sample collection and analyses. The RFA is similar to the Preliminary Assessment/Site Inspection (PA/SI) in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remediation process.

The second step consists of conducting an RFI to determine the nature and extent of contamination resulting from releases from those SWMUs determined in the RFA to require further investigation. The RFI, usually conducted by a consultant, consists of a detailed sampling and analysis program for all potentially contaminated environmental media. The RFI is roughly equivalent to the Remedial Investigation (RI) in the CERCLA remediation process.

Evaluation of the risks to human health and the environment as a result of SWMU releases is the third step in corrective action. This is similar to the Health Risk Assessment under CERCLA.

The fourth step in the RCRA corrective action process is the CMS. This study consists of engineering evaluations designed to evaluate technologies and alternatives for remediation of the SWMUs and associated contaminated media. The CMS will recommend a preferred corrective action alternative or strategy for each SWMU. The CMS is roughly equivalent to the Feasibility Study (FS) in the CERCLA remediation process.

The final two steps in the RCRA corrective action process consist of the design and implementation of corrective action measures.

1.3 RESULTS OF THE FORT BLISS RCRA FACILITY ASSESSMENT

The Interim Final RFA for Fort Bliss was performed by the U.S. Army Environmental Hygiene Agency (USAEHA) in August 1987. The Interim Final RFA (USAEHA, 1988) identified a total of 28 SWMUs in the main cantonment area and training ranges at the Fort Bliss facility.

Releases of hazardous wastes or constituents were identified, or were suspected to have occurred, from 10 of these SWMUs. These SWMUs (numbered as they are identified in the RFA) are as follows:

SWMU-002	Sanitary Landfill No. 2 (Closed) (Oil Pits)
SWMU-015	Open Demolition Area, McGregor Range
SWMU-016	Open Demolition Area, Dona Ana Range
SWMU-017	Raytheon Chromic Acid Pit
SWMU-018	Biggs Army Airfield Fire Training Area
SWMU-019	Pesticide Storage and Mixing Area
SWMU-024	Noncommissioned Officer (NCO) Academy Oxidation Lagoon
SWMU-025	Hazardous Waste and PCB Storage Facility
SWMU-027	Rubble Dump Spill Site
SWMU-028	Old Fire Training Area

Subsequent to completion of the RFA, US Army representatives determined that a total of 12 SWMUs may require investigation in the RFI. Seven of these SWMUs are contained in the RFA list of SWMUs with known or potential releases (SWMU-002, SWMU-018, SWMU-019, SWMU-024, SWMU-025, SWMU-027, and SWMU-028). SWMU-001, the Sanitary Landfill No. 1 (Active), was added to the list to be considered during the RFI. Three SWMUs were deleted from the list to be considered during the RFI due to the limited extent of releases from the sites (SWMU-015 and SWMU-016) or because corrective action at the site had been completed (SWMU-017). Four SWMUs, which were identified since the completion of the USAEHA RFA, have also been included in the list to considered during the RFI. These include:

SWMU-019B	Herbicide Storage Building No. 1160
SWMU-029	McGregor Range Fire Fighting Training Area
SWMU-025B	Orogrande Oxidation Lagoon
SWMU-045	Stormwater Impoundment Area

Subsequent to completion of the USAEHA RFA, the USEPA developed a new list of SWMUs for the Fort Bliss facility. This new list contained all of the SWMUs on the USAEHA list, as well as others. The SWMU numbering system used by the USEPA was different from that used by USAEHA.

The complete list of 13 SWMUs investigated during the course of this RFI is presented below. Note that the original USAEHA SWMU numbers, as well as the new USEPA site numbers, are provided. All SWMUs except 21 and 25B are located in Texas and are discussed in detail in this report.

USAEHA #	EPA #	SWMU NAME
SWMU-001	1	Sanitary Landfill No. 1 (Active)
SWMU-002	3	Sanitary Landfill No. 2 (Closed)
SWMU-002	4	Oil Pits at Sanitary Landfill No. 2
SWMU-018	32	Biggs Army Airfield Fire Training Area
SWMU-019A	50	Pesticide Storage and Mixing Area
SWMU-019B	63	Herbicide Storage, Building No. 1160
SWMU-024	39	NCO Academy Oxidation Lagoon
SWMU-025	30	Hazardous Waste and PCB Storage Facility
SWMU-027	15	Rubble Dump Spill Site
SWMU-028	31	Old Fire Training Area
SWMU-029	21	McGregor Range Fire Fighting Training Area
------------	25B	Orogrande Oxidation Lagoon
------------	45	Stormwater Impoundment Area

1.4 ENVIRONMENTAL SETTING

The following sections describe the environmental, geologic, hydrologic, and meteorologic conditions encountered in the vicinity of the Fort Bliss facility, which is located in El Paso, Texas as well as Otero and Dona Ana counties in New Mexico.

1.4.1 SITE LOCATION AND DESCRIPTION

The Fort Bliss facility is situated in the western corner of the State of Texas and extends northward into south-central New Mexico. The cantonment and southern maneuver areas are located northeast of the city of El Paso in El Paso County, Texas. The northern maneuver and range areas are located primarily in Otero County, New Mexico; the western half of Dona Ana Complex is located in Dona Ana County, New Mexico. Approximately 89 percent of the reservation is located in New Mexico, while the main cantonment area and remaining 11 percent are located in Texas. Figure 1-1 shows the location of the Fort Bliss facility in Texas and New Mexico, while Figure 1-2 is a site map showing the general configuration of the installation and its major component areas.

Fort Bliss extends north-northeastward from the main cantonment area for approximately 70 miles and varies in width from 30 to 50 miles. The reservation consists of five major land areas: (1) the cantonment area, adjoining the northeastern section of El Paso; (2) Maneuver Areas I, II, and VII, located south of and immediately north of the Texas-New Mexico state line; (3) McGregor Guided Missile Range in Otero County, New Mexico, east of U.S. Highway 54; (4) Dona Ana, Hueco, and Orogrande Complex, west of U.S. Highway 54 in Otero and Dona Ana Counties, New Mexico; and (5) Castner Range. The latter is an isolated parcel of land located northwest of the cantonment area at the base of the Franklin Mountains and is no longer used by the Army for training. White Sands Missile Range (WSMR) adjoins the northwestern boundary of the Fort Bliss facility; Lincoln National Forest and the Sacramento Mountains adjoin

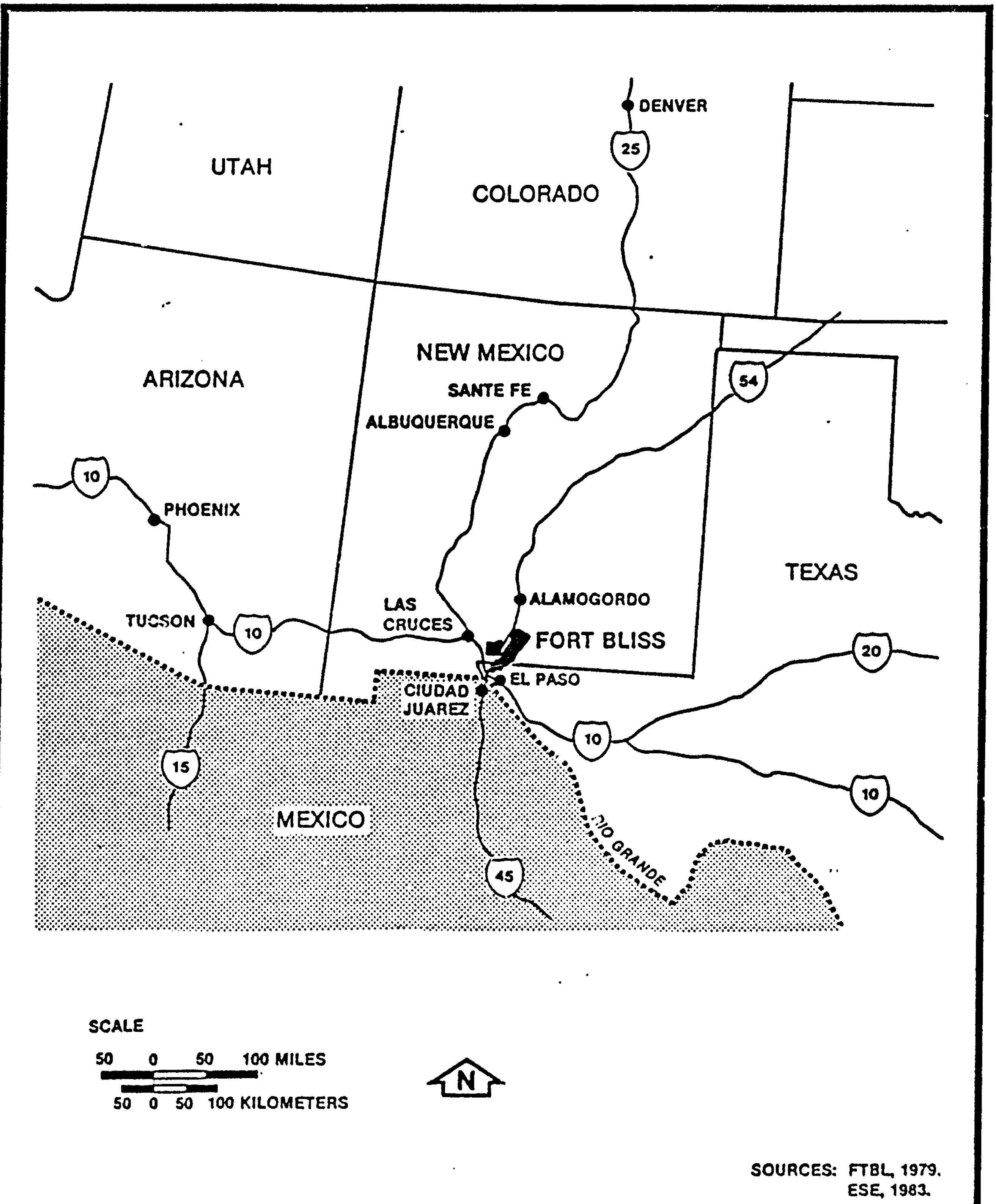

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Figure 1-1
Location Map of Fort Bliss, Texas

Drawn By: GSJ	Date: AUGUST 1990	Checked by:	File: FBloc

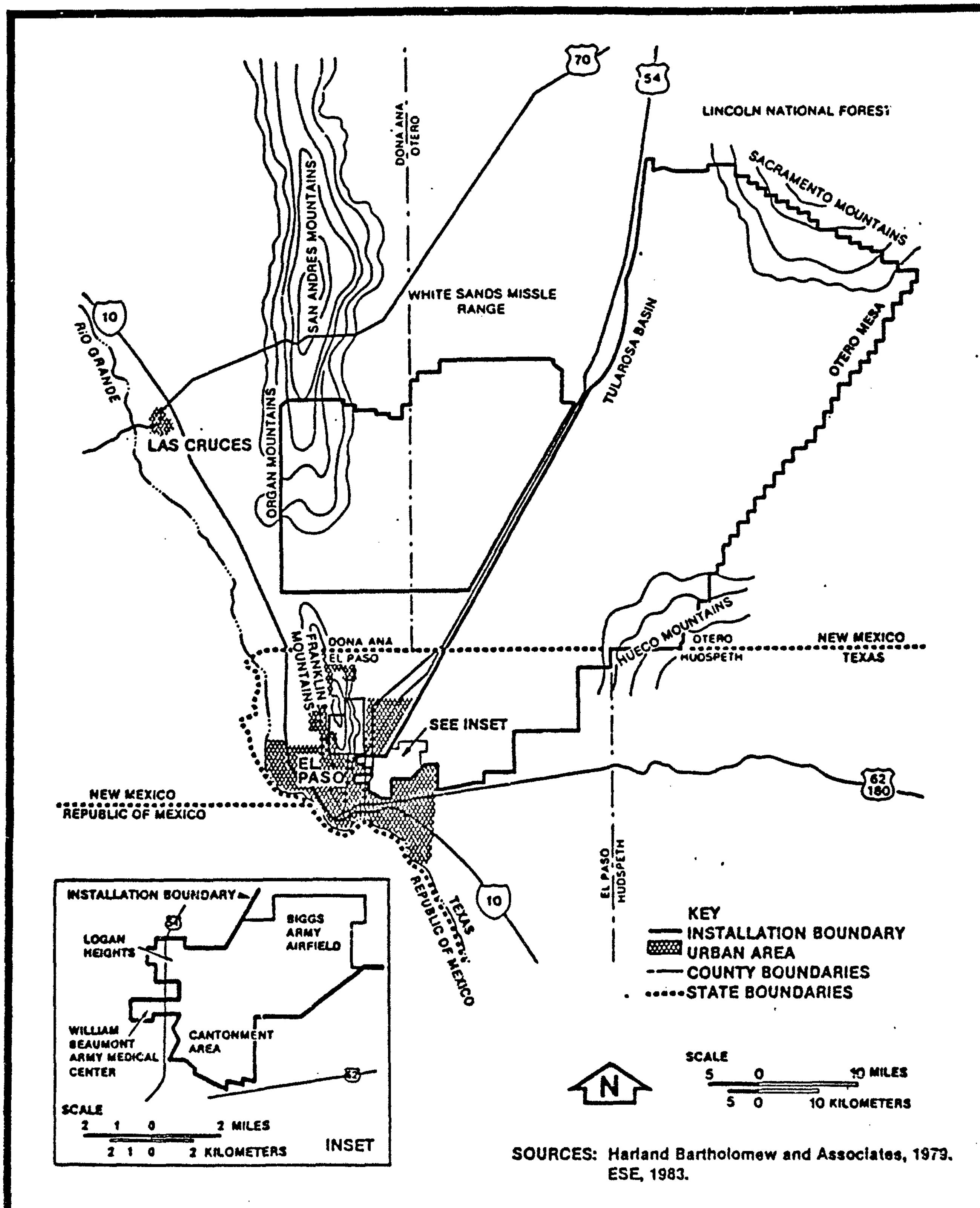

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Figure 1-2
Site Map of Fort Bliss, Texas

Drawn By:	CSJ	Date:	AUGUST 1990	Checked by:		File:	FBsite

the northern boundary; and Bureau of Land Management (BLM) and private ranch lands adjoin the eastern, western, and southern boundaries (Headquarters, 1979).

1.4.2 PHYSIOGRAPHIC SETTING

Located in eastern Dona Ana and western Otero Counties of New Mexico and northern El Paso County, Texas, the Fort Bliss facility is situated within the Basin and Range physiographic province of these states. The reservation includes four general topographic zones, each containing characteristic relief and soil. These are as follows:

- Tularosa basin -- The Tularosa basin is a broad, relatively flat desert valley lying east of the Organ and Franklin Mountains and west of the Sacramento and Hueco Mountains and Otero Mesa (Figure 1-2). As a result, the valley encompasses the central and eastern sections of Dona Ana Complex and the western section of McGregor Range as well as the cantonment and southern maneuver areas which are located east of the city of El Paso. Elevations in the valley areas range from approximately 4,200 feet (ft) in the east to approximately 2,950 ft in the west. This basin slopes gently to the west and is characterized by low, semi-stabilized sand dunes.

- Otero Mesa -- Otero Mesa is an area of low to moderate relief, covering most of the central and eastern sections of McGregor Range between the Sacramento Mountains in the north and the Hueco Mountains in the south. The mesa is characterized by a broad, relatively flat, grass-covered surface gently sloping to the east, with a sharp, west-facing escarpment rising steeply from the desert floor; local relief along this front varies from 330 to 800 ft.

- <u>Alluvial Plain</u> -- The northern portion of McGregor Range is covered by an alluvial plain of relatively low relief, sloping off the Sacramento Mountains. Similar plains are located in the western portion of Dona Ana Complex, sloping off the Organ Mountains.

- <u>Mountains</u> -- Mountain ranges onpost include sections of the Organ Mountains on the northwestern portion of Dona Ana Complex, Hueco Mountains on the central portion of McGregor Range, Sacramento Mountains on the northeastern corner of McGregor Range, and Franklin Mountains on the western area of Castner Range. Maximum elevations range to 5,700 ft above mean sea level (MSL) in the Hueco Mountains, and 8,600 ft above MSL in the Organ Mountains, located on the eastern and western areas of the Fort Bliss facility, respectively. (Headquarters, 1983).

1.4.3 METEOROLOGY

The climate of the Fort Bliss facility is characterized by arid, semi-arid desert conditions, with cool nights and hot days (Headquarters, 1979; Alvarez and Buckner, 1980) in the summer and cool days and cold nights in the winter. The warmest month is July, which records a mean daily maximum temperature of 95 degrees Fahrenheit (°F) (USAETL Terrain Analysis Center, 1978). December is the coldest month, with a mean low temperature of 33°F. The recorded temperature is higher than 90°F approximately 87 days per year; temperatures measure 32°F or lower 34 days each year. Annual rainfall averages 7.8 inches (in) (Headquarters, 1979). The midsummer months receive the greatest amount of rainfall, with an average monthly precipitation of 0.6 in, and annual snowfall averages 5 in. The annual evaporation rate is 100 in (Headquarters, DEH, 1980a). Wind storms are prevalent in March and April, with wind from the north at an average speed of 11.2 feet per second (ft/s). Summaries of monthly climatological data are presented in Table 1-1 (Headquarters, 1983).

Table 1-1. Monthly Summaries of Fort Bliss Climatological Data

Month	Temperature (°C)				Precipitation (cm)			% Frequency SWS (>8.2 m/s)
	Mean Daily Maximum	Mean Daily Minimum	Extreme Maximum	Extreme Minimum	Mean	Maximum	Minimum	
January	13.3	0.0	24.4	-22.8	0.10	0.47	0.00	4.8
February	16.7	2.2	26.7	-12.8	0.10	0.48	0.00	6.7
March	20.0	5.6	31.7	-7.2	0.07	0.57	0.00	11.4
April	25.0	10.6	35.6	-3.3	0.07	0.57	0.00	10.0
May	30.0	15.0	41.1	3.3	0.07	0.49	0.00	5.9
June	35.0	20.0	41.7	10.6	0.12	0.72	0.00	3.2
July	34.4	21.7	41.7	15.6	0.40	1.4	0.01	1.7
August	33.3	21.1	40.6	15.0	0.35	1.1	T	1.1
September	30.6	17.8	39.4	7.8	0.30	1.7	T	0.6
October	25.6	11.7	33.9	1.1	0.17	1.1	0.00	1.3
November	18.3	3.9	28.3	-8.3	0.07	0.64	0.00	2.9
December	14.4	0.6	23.9	-15.0	0.12	1.0	0.00	3.6
No. of Years of Record	21	21	21	21	21	76	85	14

T = Trace
SWS = Surface Wind Speed

Source: USAETL Terrain Analysis Center, 1978; Headquarters, 1983.

1.4.4 GEOLOGY

Fort Bliss is located in a large intermontane lowland comprised of the Tularosa basin in the north and the Hueco bolson (basin) in the south. The structural and groundwater divide between the two basins is located approximately 21 miles north of the Texas-New Mexico state line. The majority of the installation is underlain by unconsolidated alluvial deposits of Quaternary age. The deposits consist of sands, gravels, and caliche. Precambrian and sedimentary rocks, igneous, and sedimentary bedrock of Permian, Pennsylvanian, and Cretaceous ages underlie the entire installation and outcrop in the mountain ranges flanking the basin. These ranges consist of the Franklin Mountains to the west, Organ Mountains to the northwest, and the Sacramento Mountains to the northeast. The Hueco Mountains are situated in the eastern portion of Fort Bliss and span the Texas-New Mexico border. Granitic rocks are exposed in relatively large areas in the Franklin Mountains, in most of the Organ Mountains, and in isolated areas in the southern part of the Hueco Mountains. A Precambrian rhyolite porphyry crops out on the east flank of the Franklin Mountains (Knowles and Kennedy, 1958).

1.4.4.1 Sedimentary Sequence

The Lanoria quartzite of Precambrian age crops out along the east flank of the Franklin Mountains. The Bliss sandstone of Cambrian/Ordovician age extends along the east flank of the Franklin and Organ Mountains where it generally overlies the granite. It outcrops in small areas of the southern part of the Hueco Mountains, ranges in thickness from zero to 300 ft and generally is conglomeratic near the base and very fine-grained near the top.

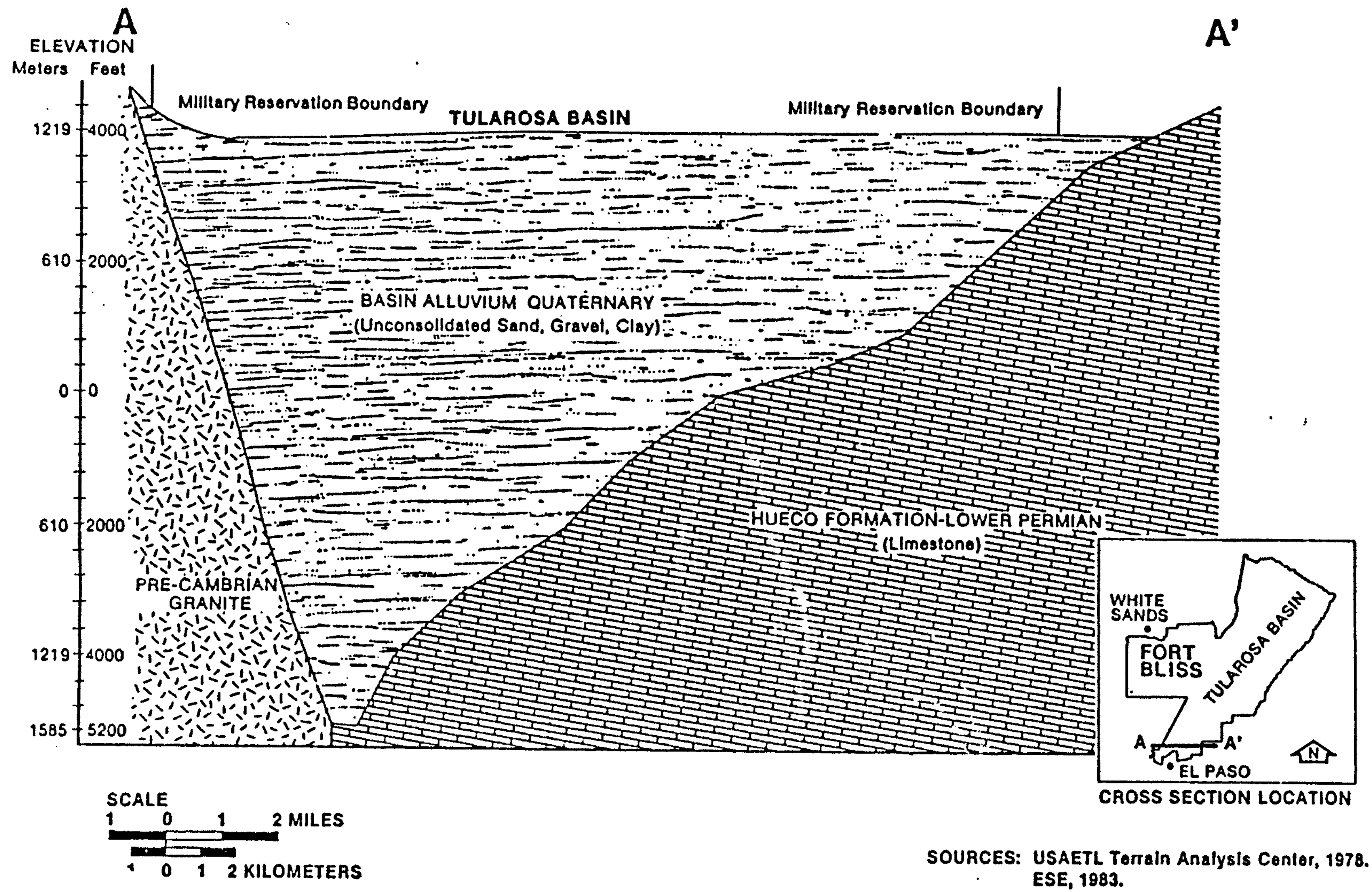
A thick sequence of limestones ranging in age from Ordovician to Cretaceous overlies the Bliss sandstone. These are generally hard, dense, and massive, and in places are interbedded with shale, sandstone, and chert.

The central portion of the Fort Bliss facility is underlain by unconsolidated alluvial layers of clay, sand, and gravel of Quaternary and Tertiary age. A cross-section of the installation (Figure 1-3) shows that the contact between the overlying alluvium and bedrock forms a wedge of alluvium, with the depth to bedrock ranging from 0 to 9,050 ft from east to west in the central portion of the installation.

1.4.4.2 Unconsolidated Deposits

Unconsolidated Hueco bolson deposits consist of layers of clay, sand and gravel of Tertiary age. Individual beds range in thickness from thin to massive and are discontinuous. The bolson deposits consist primarily of fluvial and lacustrine sequences. Alluvial fan sediments and eolian deposits can also be recognized throughout the area.

Sands and gravels of the Hueco bolson are thickest and coarsest near the Franklin and Organ Mountains. Sands become finer grained and thinner to the east, and very little water-bearing sand is found near the Hueco Mountains. Gradation to finer grained sand and gravel toward the east indicates that the igneous rocks of the Franklin and Organ Mountains were the main source of the bolson deposits. Beds of gravel generally are thin and lenticular. Sands and gravels are generally gray to salt-and-pepper colored. Clays in the Hueco bolson generally are reddish-brown to brown and range from pure clay to clay commonly mixed with sand. Caliche lies nearly everywhere beneath the surface on the installation. The caliche is a nearly continuous layer of hard white calcium carbonate, generally found 2 ft to 4 ft below the surface. Thickness ranges from 0 to 6 ft. Beds of caliche are also found interbedded with other materials in the bolson deposits; these caliche beds are disturbed or fractured, and are absent near the mountains.



SOURCES: USAETL Terrain Analysis Center, 1978.
ESE, 1983.

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Figure 1–3
Geologic Cross Section Through Fort Bliss, Texas

FORT BLISS
EL PASO, TEXAS

Drawn By: GSJ | Date: JULY 90

1.4.4.3 Structural Geology

Fort Bliss is located in a large intermontane lowland comprised of the Tularosa basin in the north and the Hueco bolson in the south. The Tularosa basin is bounded by the San Andres and Organ Mountains on the west and the Jicarilla, Sierra Blanca and Sacramento Mountains to the east. Northward, the Tularosa basin rises gradually to form the Chupadera Mesa. In the south, it is separated from the Hueco bolson which extends southward to the Rio Grande, by a low, indefinite divide, a few miles north of the Texas state line. The Hueco bolson on the south is a deep structural trough bounded by the Organ and Franklin Mountains on the west, the Hueco, Finlay, and Malone Mountains on the east, the Tularosa basin on the north, and the mountain ranges of Mexico on the south.

Tularosa basin is a graben, bounded on the east and west by tilted fault block mountains. Faulting has produced steep scarps on the west side of the Sacramento Mountains and on the east side of the San Andres Mountains north of the installation. Strata dip gently to the west in the San Andres Mountains and to the east in the Sacramentos. Permian rocks are exposed in several low hills trending north from the Jicarilla Mountains, suggesting a partly buried fault-block ridge, possibly formed by step-faulting along the east side of the basin (Herrick and Davis, 1965).

Hueco bolson also is bounded by steep fault scarps on the east side of the Franklin Mountains and the west side of the Hueco Mountains. At least six long, narrow, asymmetrical, north-trending depressions break the even surface of the bolson. They are definite structural features probably resulting from faulting (Sayre and Livingston, 1945).

1.4.5 HYDROGEOLOGY

The groundwater divide between the Tularosa basin and the Hueco basin is situated approximately 21 miles north of the New Mexico-Texas state line. The Hueco bolson aquifer is the principal unit from which water supplies are drawn in the area of the Fort Bliss facility. The hydrology of this unit is described in depth in the proceeding sections.

1.4.5.1 Regional Hydrologic Units

The Hueco bolson is the principal aquifer supplying fresh groundwater for military, municipal, and industrial supply in the El Paso area. The aquifer extends over areas in Texas, New Mexico and Mexico. The northern part of the bolson, in Texas and New Mexico, iies between the southern Organ Mountains and the Franklin Mountains on the west, and the Hueco Mountains on the east. To the north, the Hueco bolson extends 21 miles north of the Texas state line into New Mexico; thus, the topographic divide between the Tularosa basin and the Hueco basin is not a groundwater divide. The bolson extends south to the Rio Grande. Along the Rio Grande, alluvium is entrenched about 200 to 250 ft into the Hueco bolson sediments and locally called the El Paso-Juarez Valley (White, 1987).

The primary water-bearing material of the Hueco bolson and the Rio Grande alluvium is the unconsolidated basin fill (Knowles and Kennedy, 1956). In the northern part of the bolson, Davis and Leggat (1967) reported that the thickest section of basin fill occurs as a trough-shaped body, adjacent and parallel to the Franklin Mountains. The total thickness of this section may be as much as 9,000 ft in some areas. In the southeastern part of the bolson between El Paso and Clint, the basin fill is from 1,000 to 3,000 ft thick (Davis and Leggat, 1967).

1.4.5.2 Hydraulic Properties

A large number of aquifer tests have been conducted in the El Paso area to determine hydraulic characteristics of Hueco bolson deposits. Based on these tests and groundwater modeling verified by the US Geological Survey (USGS), Hueco bolson deposits in this area are estimated to have the following hydraulic characteristics.

- Coefficients of storage
  - Water table (mesa) area - 0.16 to 0.30 (specific yield)
- Coefficients of transmissibility
  - Water table (mesa) area - 10,000 to 280,000 gallons per day per foot (gpd/ft)
  - City of El Paso artisan area - 50,000 to 120,000 gpd/ft.

These results represent hydraulic characteristics primarily in the El Paso area. The Rio Grande alluvium in the El Paso Valley is a much thinner aquifer than the Hueco bolson. Specific yield is estimated at 0.20, and transmissivity is estimated at 30,000 gpd/ft (Alvarez and Buckner, 1980).

Recharge to the Rio Grande alluvium occurs from (1) infiltration of precipitation which falls directly on the surface and runoff from the adjoining bolson surfaces, (2) upward leakage from the underlying Hueco bolson deposits, (3) leakage from the Rio Grande and numerous canals which traverse the heavily cultivated and irrigated floodplain, and (4) excess irrigated water applied to the cultivated land (Alvarez and Buckner, 1980).

1.4.5.3 History of Groundwater Usage

The following summary is condensed primarily from White (1983). Large-scale development of groundwater in the Hueco bolson started in the early 1900's when deep wells were drilled in the Old Mesa well field to supply residents of El Paso and Fort Bliss. The Old Mesa field was located in what is now the Fort

Bliss sump and the El Paso Water Utilities Mesa plant yard northeast of the intersection of Railroad Drive and Fred Wilson Road. The field was first developed in 1904. The Old Mesa wells were gradually abandoned because of their low operating efficiency and were replaced by large-diameter wells with turbine pumps. The well field produced a total of 68,000 acre-ft through 1926 when it was shut down and the wells were abandoned.

Some of the early large-capacity wells in the Hueco bolson included Fort Bliss No. 1 (JL-49-13-509) drilled in 1913 at the main base pumping plant; City of El Paso No. 1 (JL-49-13-817) drilled in 1918 near the intersection of Madison (now Radford) and Montana Streets; and Ciudad Juarez No. 1 drilled in 1925. All of these wells have been abandoned because of failure of casing seals and screens, and deterioration of water quality.

The Hueco bolson metropolitan area is arbitrarily defined in this report as having large-scale groundwater development and a freshwater section generally exceeding 100 ft (30 meters) in thickness in 1980. The pumpage in the metro area is separated according to use in the United States and Mexico. Prior to the early 1950's, the metro pumpage was less than 30,000 acre-ft per year. Since 1953, the annual withdrawals have increased at an average rate of about 3,600 acre-ft per year and in 1970, totaled 84,982 acre-ft. During that year, the City of El Paso pumped 39,949 acre-ft from 60 wells, and Ciudad Juarez pumped 23,985 acre-ft from 23 wells. By 1980, pumpage in the metro area had increased to 129,231 acre-ft; the City of El Paso pumped 58,213 acre-ft from 81 wells, and Ciudad Juarez pumped 55,808 acre-ft from 52 wells.

The cumulative pumpage from the Hueco bolson metro area, during 1906-80, totals about 3.0 million acre-ft. About 73 percent of the water (about 2.2 million acre-ft) has been pumped in the United States, and about 27 percent (about 0.8 million acre-ft) has been pumped in Ciudad Juarez.

1.4.5.4 Regional Water Quality

Water in the Hueco bolson aquifer is predominantly brackish; however, a potable lens rests on the more dense mineralized water. Except near the gravelly alluvial fans at higher elevations, recharge is limited due to the nearly impermeable caliche. This, in addition to excessive pumping of the aquifer, has resulted in the rapid decline of freshwater elevations. Depth to water in the Texas portion of the installation is approximately 300 ft (Headquarters, 1983).

In the El Paso valley, relatively fresh water (<2,000 milligrams per liter [mg/l] dissolved solids) tends to occur near the river in the shallow aquifer. The deeper water in the alluvium appears to have been locally influenced by upward leakage of better quality water from the artesian portion of the Hueco bolson.

1.4.5.5 Flow Patterns

The following discussion on flow patterns is largely condensed from White, 1983. Groundwater in the Hueco bolson flows from areas of recharge to point of discharge. The rate of movement is slow, normally less than 1.0 foot (0.3 meter) per day or a few hundred feet per year, and is controlled by the ability of the aquifer to transmit water (hydraulic conductivity) and the slope (gradient) of the water table.

Prior to and during the early 1900's, groundwater in the Hueco bolson flowed south from the Texas-New Mexico line, and east to southeast from the Sierra de Juarez. The general direction of water movement was toward the valley of the Rio Grande, where the water would be discharged as seepage or through evapotranspiration.

The historical (1906-80) withdrawals of groundwater from the Hueco bolson metro area, totalling about 3 million acre-ft, have caused major water-level declines. These declines have significantly changed the direction and rate of flow. In 1980, most of the measured flow was toward the centers of pumping.

The greatest historical (1903-80) water-level declines (deepest cones of depression) of 130 ft are in the downtown areas of El Paso and Ciudad Juarez. The downtown areas have had long-term, large-scale groundwater withdrawals from well fields located near relatively impermeable bedrock boundaries along the fronts of the Franklin and Juarez Mountains.

The historical declines in the Hueco bolson decrease with distance from the centers of pumping to a minimum of 10 ft along the eastern and southeastern boundaries of the El Paso area. The average 1903-80 decline in water levels over the 223 square miles in the Texas part of the metro area is about 53 ft.

Water levels in the shallow aquifer declined as much as 20 ft from 1936-67. The declines are attributed to urbanization of the valley and increased pumping of the Hueco bolson which induced downward leakage from the surface alluvium.

The rates of declines accelerated after the river was lined from downtown El Paso through the Chamizal Zone in 1968. However, part of the increase in the rate of decline can be attributed to an increase in bolson pumpage in El Paso and Ciudad Juarez. During 1967 to January 1980, the water levels in shallow wells declined about 20 to 30 ft near the downstream end of the lined section of the river, and from 70 ft to more than 80 ft in downtown El Paso. In other parts of downtown El Paso and probably in Ciudad Juarez, the Rio Grande alluvium has been drained and the shallow water table has declined to the uppermost section of bolson fill.

Recent studies (White, 1983) indicate that groundwater in the shallow aquifer in southeast El Paso is moving northeast away from the river. Movement near the downstream end of the lined section is to the north and west toward centers of pumping from bolson wells. In those areas, the Rio Grande is now a major source of recharge to the shallow aquifer, rather than a source of discharge.

1.4.5.6 Well Locations and Use

The most recent well information data from the Fort Bliss facility was derived from Headquarters (1983). More than 70 abandoned wells exist on the Fort Bliss facility; many of these wells were constructed for exploration for water and oil. Seventeen operational water supply wells currently exist on the Fort Bliss facility (Figure 1-4), fourteen of these wells are currently active. Most of these supply wells are placed 0.36 miles apart to minimize the cone of depression from pumpage and reduce the infiltration of poor quality water from excessive pumpage. Well data for these water supply wells are presented in Table 1-2, while Table 1-3 contains the physical data for these water supply wells.

1.4.5.7 Local Water Quality

Surface water features on Fort Bliss consist of seasonal playas, ephemeral streams, and oxidation ponds. In addition, small ponds have been developed in the northeastern portion of the Fort Bliss facility from water in the adjoining Lincoln National Forest to support cattle grazing and wildlife management programs (Headquarters, 1979). Surface water quality data for these ponds were not available.

Below the ground surface at Fort Bliss, a nearly continuous layer of caliche retards the infiltration of precipitation and creates a barrier to the downward migration of potential contaminants. Beds of caliche are also found intercalated with other materials in the bolson deposits to a depth of about 100 meters.

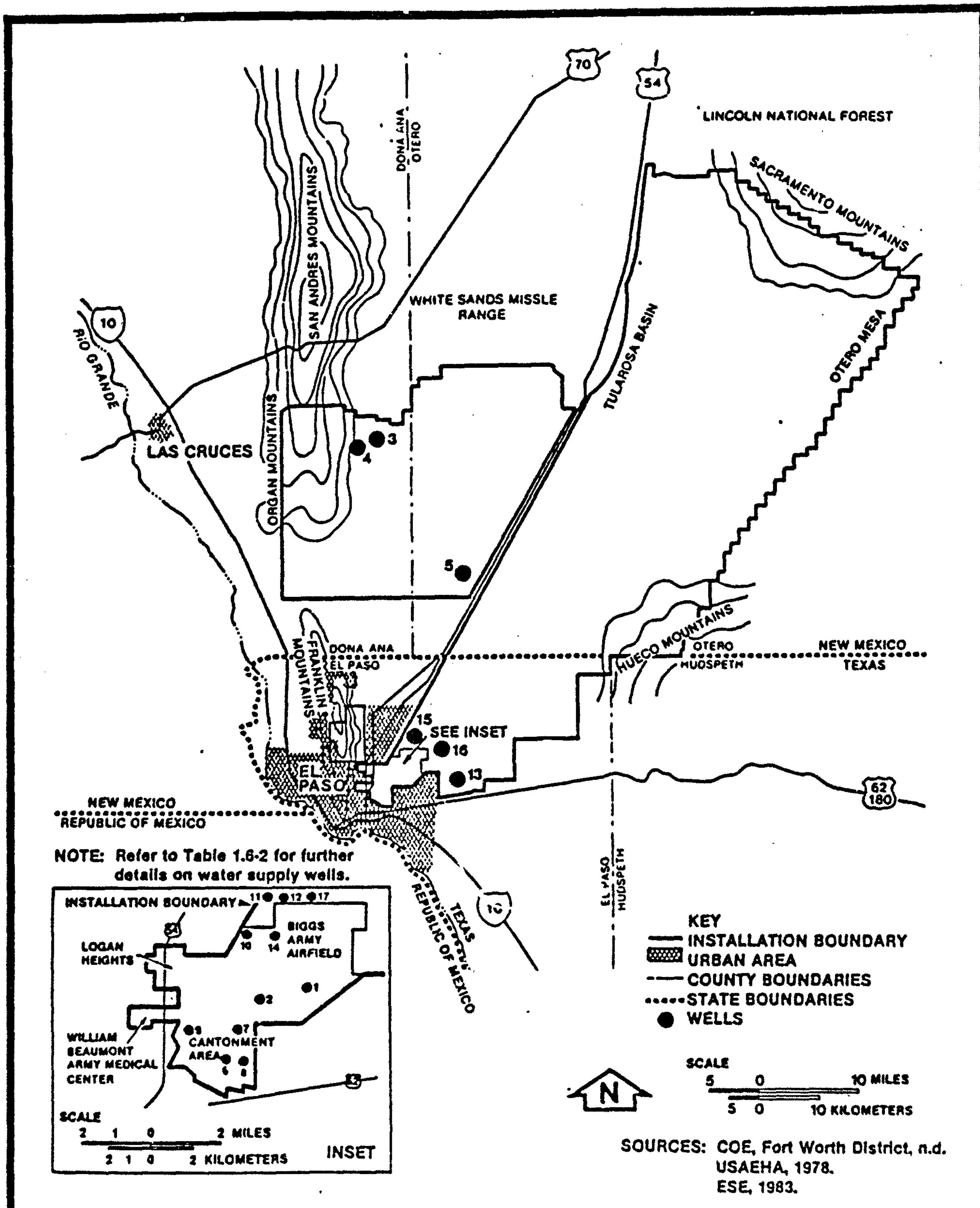

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Figure 1-4
Locations of Water Supply Wells on Fort Bliss, Texas

Drawn By: GSJ	Date: AUGUST 1990	Checked by:	File: FBH20

Table 1-2. Water Supply Wells on Fort Bliss

Well No.*	Water Elevation Static (ft)	Water Elevation Pumped (ft)	Drawdown (ft)	Remarks
1	991	1191	200	Bldg. 11241; Biggs Area Well 1A; Fort Bliss Well 1A
2	1115	--	--	Bldg. 11182; Biggs Area Well 2A; Fort Bliss Well 2A
3	--	--	--	Bldg. 8229; Dona Ana Target Range Well 2
4	--	--	--	Bldg. 8101; Dona Ana Target Range Well 3
5	--	--	--	Hueco Firing Point Well 3
6	886	1141	256	Bldg. 1170; Fort Bliss Well 5
7	984	1092	108	Bldg. 1252; Fort Bliss Well 6
8	984	1056	72	Bldg. 2451; Fort Bliss Well 7
9	905	1122	216	Bldg. 1315; Fort Bliss Well 9
10	899	1046	148	Bldg. 3696; Fort Bliss Well 10
11	836	945	108	Bldg. 3697; Fort Bliss Well 11
12	1000	1082	82	Bldg. 3698; Fort Bliss Well 12
13	--	--	--	Bldg. 6911; unnumbered well
14	971	1063	92	Bldg. 3699; Fort Bliss Well 13
15	1066	--	--	Bldg. 3796; Fort Bliss Well 14
16	1066	1220	154	Bldg. 3797; Fort Bliss Well 15
17	1082	1214	131	Bldg. 3798; Fort Bliss Well 16

* See Figure 1.6-5
-- Not Available

Sources: U.S. Army Corps of Engineers (COE), Fort Worth District, n.d.
USAEHA, 1978.
Headquarters, 1983.

Table 1-3. Physical Data for Fort Bliss (page 1 of 2)

USGS Well No.	Date Opened	Depth (ft)	Diameter (ft)	Yield (gpm)	Remarks
49-05-311	1951	749.8	---	150.0	
49-05-904	1958	833.8	---	1,100.2	Production
49-06-201	1953	799.7	---	800.1	Test well, destroyed
49-06-501	1953	1005.0	0.25	---	Observation well
49-06-502	---	---	0.50	---	Oil well, abandoned
49-06-601	1953	315.9	0.25	---	Test well, dry
49-06-602	---	---	0.50	---	Destroyed
49-06-701	1959	818.7	2.00	1,571.2	
49-06-702	1952	449.7	0.50	---	Observation well
49-06-703	1952	549.7	0.50	---	Observation well
49-06-704	1940	989.6	---	---	Test well, filled
49-06-705	1940	956.4	---	---	Test well, filled
49-13-204	1941	916.8	2.00	---	
49-13-205	1937	799.7	0.50	---	Observation well
49-13-211	1939	1137.0	---	---	Test well
49-13-213	1937	697.7	---	---	Test hole, abandoned
49-13-214	1937	829.[illegible]	---	---	Test hole, abandoned
49-13-302	1953	811.5	2.00	---	Supply well, abandoned
49-13-303	1956	7[illegible]8.7	2.17	---	Supply well
49-13-304	1953	811.5	2.00	1,200.2	
49-13-305	1953	815.7	2.00	1,200.2	
49-13-306	1941	949.6	0.33	---	Test well
49-13-307	1967	811.5	2.00	1,500.2	
49-13-310	---	399.8	0.83	---	
49-13-311	1973	814.8	2.00	1,007.1	
49-13-503	1942	915.4	2.00	870.1	
49-13-504	1931	784.6	2.00	---	
49-13-505	1969	805.6	2.00	---	
49-13-506	1953	904.6	.33	---	Test well
49-13-507	1917	599.6	1.00	250.0	Plugged, abandoned
49-13-508	1913	651.7	0.83	---	Plugged, abandoned
49-13-509	1913	656.7	1.00	---	
49-13-510	1917	599.6	1.00	---	
49-13-511	1959	752.8	1.99	---	
49-13-512	1928	714.7	1.67	---	
49-13-515	1922	868.5	1.00	---	Abandoned
49-13-516	1937	859.7	1.00	700.1	
49-13-517	1937	859.7	1.00	624.1	
49-13-518	1921	863.6	1.00	660.1	
49-13-519	1941	851.5	1.33	530.1	
49-13-520	---	---	---	---	
49-13-601	1935	779.7	1.67	1,200.2	
49-13-602	1951	779.7	2.00	1,000.1	Plugged, abandoned
49-13-603	1961	774.7	2.00	1,000.1	
49-13-604	1938	908.6	2.00	1,700.3	
49-13-606	1941	777.7	1.64	1,250.2	
49-13-611	1936	399.8	0.17	---	Test well, plugged
49-13-612	1938	712.7	1.00	---	Test well
49-13-615	1967	799.7	2.00	---	
49-13-616	1951	799.7	2.00	1,266.2	Abandoned, casing pulled
49-13-619	1938	1292.0	---	---	Test well
49-13-620	1931	1117.0	---	---	Test well
49-13-621	1937	802.0	---	---	Test well
49-13-625	1977	1026.0	2.00	---	

Table 1-3. Physical Data for Fort Bliss (page 2 of 2)

USGS Well No.	Date Opened	Depth (ft)	Diameter (ft)	Yield (gpm)	Remarks
49-14-101	1959	818.7	2.00	1,658.47	
49-14-102	1952	403.8	0.25	---	Test well
49-14-103	---	224.7	0.67	---	Abandoned
49-14-104	1973	941.7	2.00	---	
49-14-105	1973	959.7	2.00	1,750.3	
49-14-201	1952	499.9	0.25	---	Observation well
49-14-301	1953	419.8	0.25	---	Test well, plugged
49-14-302	1940	---	0.58	18.0	
49-14-416	1973	949.6	2.00	2,000.3	
49-14-501	1953	949.6	---	---	Test well, plugged
49-14-502	1933	377.9	0.50	---	Plugged, covered
49-14-504	1967	498.6	1.50	22.0	
49-14-606	1974	439.8	0.67	37.0	
49-15-406	1975	439.8	0.83	---	
49-15-503	---	---	---	---	
49-15-504	1974	416.9	0.50	---	

--- Not available

Source: Headquarters, 1983

Local recharge may occur where the caliche is absent or fractured or where earthmoving activities (e.g., landfill operations) have disturbed the caliche layer.

Water for the Fort Bliss facility distribution systems is supplied by wells drilled approximately 260 ft into the Hueco bolson aquifer. The locations and physical characteristics of the wells are described in Table 1-3. The water quality is hard to very hard and generally meets National Interim Primary Drinking Water Regulations (NIPDWR) and National Secondary Drinking Water Regulations (NSDWR) maximum contaminant levels. During 1972-77, the maximum concentrations of lead and mercury observed in the Fort Bliss main distribution system were slightly above the NIPDWR standards, although mean values were well below criteria. The source of lead, mercury, and iron in the Fort Bliss distribution system was not established, although subsequent sampling of the distribution system for NIPDWR and Texas Department of Health requirements showed no violations of criteria. Total dissolved solids (TDS) concentrations in the Fort Bliss facility main, Dona Ana, and City of El Paso distribution systems and iron in the Fort Bliss facility main distribution system exceeded NSDWR standards. The high TDS concentrations are a direct consequence of the mineralized nature of the raw water (Headquarters, 1983).

Relatively recent (1979-81) analyses of water from wells along Fred Wilson Road and nearby Fort Bliss facility production wells in northeast El Paso show a general increase in dissolved solids and a marked increase in nitrate concentrations above background levels (White, 1987). Available data indicate that a substantial amount of inferior-quality water is being recharged to the Hueco bolson aquifer by shallow groundwater seepage into abandoned wells in and near the Old Mesa well field. The seepage originates mostly as impounded urban runoff and possibly by deep percolation of slightly saline irrigation water (White, 1987).

Water is supplied to the Fort Bliss facility by several separate distribution systems, which include the Fort Bliss main/WBAMC, BAA, City of El Paso, Site Monitor, Dona Ana Range Camp, Hueco Range Camp, and Orogrande Range Camp systems. The Fort Bliss main/WBAMC and BAA distribution systems are connected to the City of El Paso distribution to ensure additional water supply in case of an emergency.

Water treatment consists of chlorine disinfection preceded, in most cases, by sand filtration. In addition, the cantonment area/WBAMC water is treated with sodium hexametaphosphate for corrosion control, and water provided to WBAMC is softened with a zeolite ion exchange system.

1.4.5.8 Drainage Patterns

Located in the Chihuahuan Desert biotic zone, Fort Bliss is generally arid. Surface water on the reservation consists of watering tanks supplied by pipelines and by numerous playas, seasonally containing water during periods of moderate to heavy precipitation. Intermittent streams handle surface runoff during such periods before water dissipates by seeping into the ground or by evaporation. There are no streams which divert water off of the Fort Bliss reservation.

1.4.5.9 Recharge and Discharge

Recharge of groundwater occurs primarily on the east flank of the Franklin and Organ Mountains. Most of the runoff from the mountains infiltrates the coarse gravel alluvial fans near the mountains, thereby recharging the aquifer. Very little recharge occurs in other areas of the installation due to the caliche layer just beneath the surface.

Discharge from the aquifer underlying the Fort Bliss facility occurs primarily through pumping of wells on the installation. Minor discharge occurs south of Fort Bliss by upward seepage into the overlying Rio Grande alluvium.

1.4.6 SOILS

All of the SWMUs at the Fort Bliss facility lie in areas encompassed by five morphologically similar soil associations, shown in Figure 1-5. This soils map was derived from two separate soil surveys: Otero Area, New Mexico (parts of Otero, Eddy and Chaves counties), 1981; and El Paso County, Texas, 1971. The actual SWMUs lie in either of two soil associations: the Pintura-Dona Ana of Otero Area, New Mexico, or the Hueco-Wink of El Paso County, Texas.

1.4.6.1 Description

The five soil associations or complexes are described as shallow to deep, well-drained or somewhat excessively drained soils that formed in alluvial and eolian material. These soils are on nearly level to undulating, medium textured and coarse textured dunes and the areas between the dunes.

In the duned areas, dunes consist of somewhat excessively drained soils and typically have about 12 in of brown to reddish-brown loamy fine sand at the surface. The substratum is light brown to light reddish-brown fine sand and loamy fine sand to a depth of 60 in. This soil is slightly calcareous and mildly alkaline throughout.

The well-drained soils between the dunes have typically 3 in of brown to reddish-brown fine sandy loam at the surface. The subsoil is brown to reddish-brown sandy clay loam about 18 in thick. The substratum is pinkish-gray sandy clay loam and light reddish-brown sandy loam to a depth of 60 in. This soil is strongly calcareous beneath the surface layer and moderately alkaline throughout.

Caliche, a more or less cemented deposit of calcium carbonate, occurs as soft thin layers in these soils or as hard, thick beds just beneath the solum. Caliche layers are sometimes exposed at the surface by erosion (DOA, 1981).

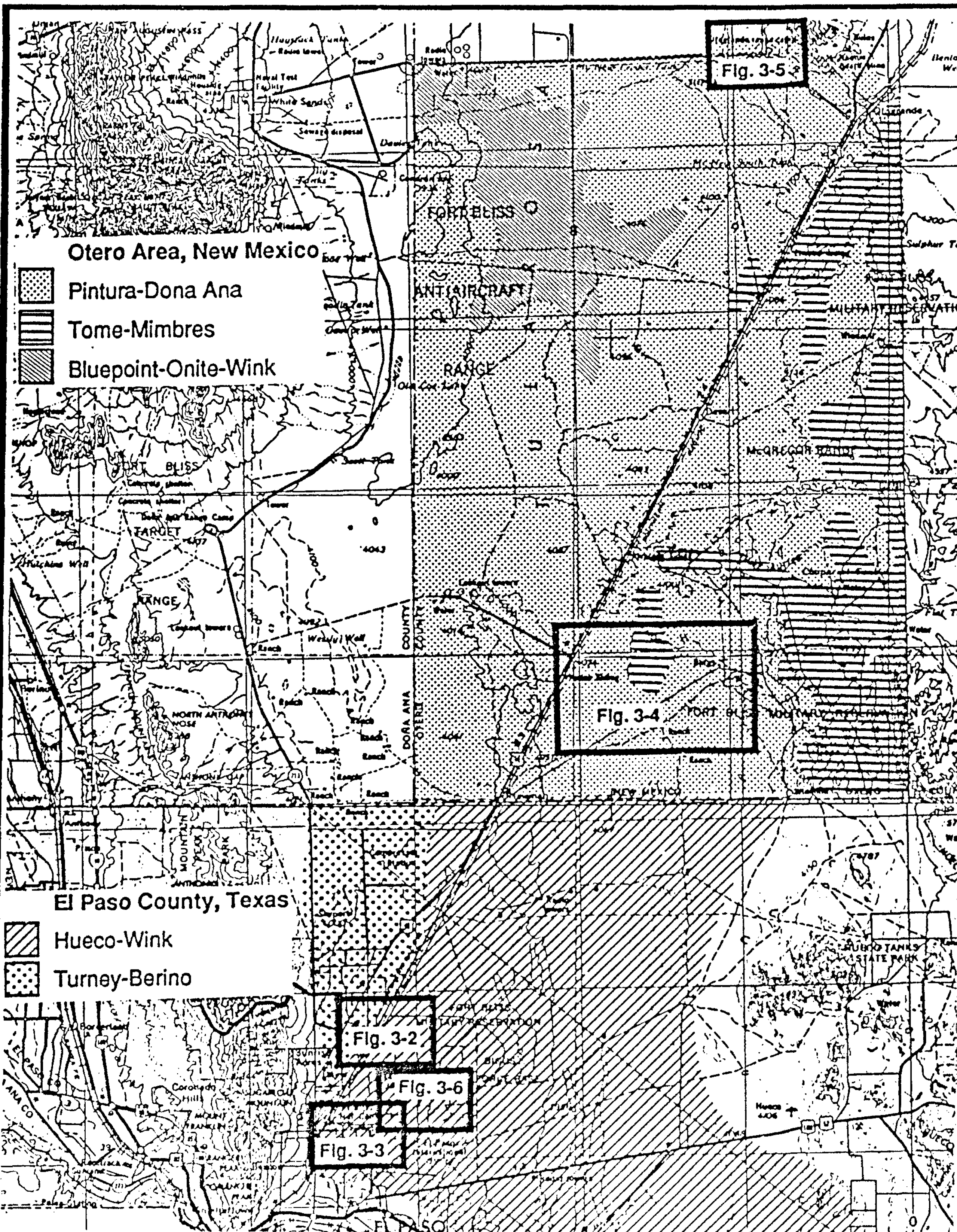

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Figure 1–5
RCRA Facility Soils Map
Scale: 1" = 4.7 miles (1:300,000)
Source: Soil Surveys – El Paso County, TX, 1971 and Otero Area, NM, 1976

Drawn By: GSJ	Date: JULY 1990	Checked by:	File: FBsoil

Although the appearance and landscape of these soil associations are similar, there is some variance in physical and engineering properties, which are listed in Table 1-4. These variances are partly due to data being derived from two separate soil surveys performed six years apart. As an example the Wink soil is listed in the El Paso County survey with the Hueco-Wink association and in the Otero Area survey with the Bluepoint-Onite-Wink association. The table shows some variances in properties between the two listings.

1.4.6.2 Formation

Most of El Paso County is underlain by intermontane sediments known locally as bolson deposits. These sediments were eroded from the nearby mountains. They filled the basin that was formed during the uplift of the mountains that occurred in the Tertiary Period and continued into the Quaternary Period. The basin in El Paso County, called the Hueco bolson, was initially enclosed but was later drained when the Rio Grande made its present course. Since that time, water from runoff and rain has leached the carbonates in the soil and formed the layers of caliche that occur at various depths below the surface (DOA, 1971). The soils that formed in this bolson are the Turney-Berino and Hueco-Wink associations.

The soils in the Otero Area formed in material derived from many sources, ranging from igneous and sedimentary rock to very recent alluvial and eolian sediment. The Tome-Mimbres soils formed in very recent, fine textured alluvial material. They have undergone little change since the parent sediment was deposited; however, they occupy a more upland position which no longer floods. Less caliche has formed in the Tome-Mimbres than in the Turney-Berino or Hueco-Wink since less water has leached the former.

Table 1-4. Physical and Engineering Properties of Soils (page 1 of 2).

Soil Name	Depth inches	USDA Texture	Unified Classification	% Passing Sieve 4	10	40	200	Liquid Limit (%)	Plasticity Index	Permeability in./hr.	Available Water Cap. in./in.	Soil Reaction pH	Salinity umhos/cm	Shrink-Swell Potential
Bluepoint	0-8	Loamy fine sand	SM	90-100	90-100	75-85	20-35	—	NP	6.0-20	0.06-0.10	7.4-8.4	<8	Low
	8-60	Loamy fine sand, fine sand	SM	90-100	90-100	70-80	15-25	—	NP	6.0-20	0.06-0.10	7.4-8.4	<8	Low
Onite	0-10	Loamy fine sand	SM	100	100	50-95	15-35	—	NP	6.0-20	0.06-0.10	7.4-7.8	<2	Low
	10-30	Sandy loam, gravelly sandy loam	SM	100	100	75-95	15-35	—	NP	6.6-20	0.07-0.12	7.4-8.4	<2	Low
	30-60	Loamy sand gravelly sandy loam sandy loam	SM	65-100	95-100	50-85	10-35	—	NP	6.6-20	0.06-0.12	7.9-8.4	<2	Low
Wink	0-2	Loamy fine sand	SM, SM-SC	90-100	90-100	80-100	15-35	—	NP-6	6.6-20	0.08-0.14	7.9-8.4	<2	Low
	2-18	Sandy loam, loam	SM, SM-SC	90-100	90-100	80-100	25-45	15-25	NP-10	6.6-20	0.10-0.15	7.9-8.4	<2	Low
	18-16	Sandy loam	SM, SM-SC	90-100	90-100	80-100	15-45	15-45	NP-10	6.6-20	0.00-0.06	7.9-8.4	<2	Very low
Mimbres	0-6	Silt loam	CL-ML, CL	100	100	95-100	70-90	20-35	5-15	6.0-20	0.13-0.19	7.4-8.4	<4	Moderate
	6-25	Silty clay loam, Silt loam, clay loam	CL	100	100	90-100	75-95	25-45	10-25	6.6-20	0.16-0.21	7.5 8.4	<4	Moderate
	25-60	Silty clay loam,	CL	90-100	90-100	80-100	75-95	30-45	10-25	6.6-20	0.13-0.16	7.9-8.4	<4	Moderate
Tome	0-5	Silt loam	ML	100	100	90-100	50-60	20-30	NP-5	6.0-20	0.18-0.20	7.9-8.4	<2	Low
	5-60	Stratified very fine sand loam and silt loam	CL-ML, CL	100	100	95-100	75-85	25-35	5-15	6.6-20	0.16-0.18	7.9-8.4	<2	Moderate
Pintura	0-60	Loamy fine sand	SP-SM, SM	100	100	70-95	5-25	—	NP	6.0-20	0.05-0.08	7.4-7.8	<2	Low
Dona Ana	0-3	Fine sandy loam	SM	95-100	90-100	80-100	30-50	15-25	NP-5	6.6-20	0.10-0.13	7.9-8.4	<2	Low
	3-37	Sandy clay loam	SC, SM-SC	95-100	90-100	80-90	35-50	25-40	5-15	6.0-20	0.13-0.17	7.9-8.4	2-4	Moderate
	37-60	Sandy loam	SM-SC, SM	95-100	90-100	60-75	30-45	20-35	5-10	6.0-20	0.13-0.17	7.9-8.4	2-4	Moderate
Hueco	0-4	Loamy fine sand	SP	100	100	65-80	0-5	20	4	>20	.03-.05	—	—	Low
	4-26	Fine sandy loam	SP	100	100	70-85	0-10	—	—	6.3-20	.08	—	—	Low
	26-60	Indurated caliche	SM, SM-SC	100	100	80-95	15-30	—	—	6.3-20	.10	—	—	Low
Wink	0-24	Fine sandy loam	SM-SC	100	95-100	95-100	20-35	20	5	6.3-20	.10	—	—	Low
	24-73	Cemented caliche	—	—	—	—	—	—	—	—	—	—	—	Low
	73-100	Gravelly loam	SM or SM-SC	90-95	70-85	65-80	25-45	—	—	6.3-20	.08	—	—	Low
Turney	0-3	Fine sandy loam	SM or SM-SC	100	100	90-100	25-45	29-36	16-24	6.3-20	.10	—	—	Low
	3-10	Loam	CL	100	95-100	85-95	50-65	—	—	6.3-20	.15	—	—	Moderate
	10-34	Clay loam	CL	100	95-100	75-90	55-70	—	—	6.6-20	.16	—	—	Moderate
	34-60	Caliche (about clay loam texture)	CL	95-100	95-100	75-90	55-70	—	—	6.6-20	.15	—	—	Moderate
	60-80	Fine sandy loam	SM or SM-SC	100	100	90-100	25-45	—	—	6.3-20	.10	—	—	Low

Table 1-4. Physical and Engineering Properties of Soils (page 2 of 2).

Soil Name	Depth inches	USDA Texture	Unified Classification	% Passing Sieve 4	10	40	200	Liquid Limit (%)	Plasticity Index	Permeability in./hr.	Available Water Cap. in./in.	Soil Reaction pH	Salinity umhos/cm	Shrink-Swell Potential
Berino	0-8	Fine sandy loam	SM or SM-SC	100	100	90-100	25-45	29-38	17-24	6.3-20	.10	—	—	Low
	8-13	Loam	CL	100	100	85-95	60-75	—	—	6.3-20	.15	—	—	Moderate
	13-37	Clay loam	CL	100	95-100	65-80	55-70	—	—	6.3-20	.16	—	—	Moderate
	37-82	Loam	SC or CL	90-100	85-95	60-70	45-65	—	—	6.3-20	.15	—	—	Low to Moderate
	82-100	Fine sandy loam		100	100	90-100	25-45	—	—	6.3-20	.10	—	—	Low

— Not available

NP Non-plastic

When the Rio Grande cut through the Hueco bolson, the water held in the basin drained away and the lake bed was exposed. The bed of the old lake consisted of material made up of thick layers of clay and sand. Sand at the surface was shifted about by wind, forming the Bluepoint-Onite soils.

Eolian sediment may have been the surface of another soil, but upon erosion and redeposition it became parent material. Although the Pintura soils are the most common and most extensive soils formed in this manner, all of the soils described contain undulating and/or coppice dunes to some extent.

2.0 FIELD INVESTIGATION PROCEDURES

2.1 HEALTH AND SAFETY

An ESE Site Safety Officer (SSO) was responsible for all health and safety activities during the Fort Bliss RFI. ESE field team members discussed health and safety issues before and after each work day. Tailgate safety meetings were held in the support zone of each SWMU before any work activity began. At these meetings all personnel scheduled to work on site were instructed on all physical and chemical hazards at the specific site. Special attention was given to the possibility of heat stress, as the temperatures reached approximately 100°F each day. Personal decontamination procedures (Section 2.5.3) were also addressed during the meetings. All field activities were conducted in personal protection levels D, C and B and were supervised by an ESE SSO. Upgrading and downgrading personal protection levels were based primarily on organic vapor analysis detected during field screening activities.

Ambient air was monitored constantly during the RFI, in the site background, breathing zones, and sample collection area of each SWMU. This monitoring was performed by the SSO using a Foxboro Model 128 flame ionization detector (FID) organic vapor analyzer (OVA), or an HNU Model P1 101 photoionization detector (PID) Trace Gas Analyzer. A GasTech Quad Meter (explosimeter) was used to monitor the work environments suspected of containing combustible gases. Calibration of the air monitoring instruments were performed at the start of each day using a standard gas. Additional calibrations were made if the unit experienced abnormal perturbations or if readings became erratic. The calibration and air monitoring records and results are included in Appendix D of this report. A list of protection levels and personal protective equipment (PPE) is included in Appendix E.

2.2 SAMPLING PROCEDURES

The sampling procedures used during the Fort Bliss RFI are described in this section. These procedures are also ESE's field sampling standard operating procedures (SOPs). The procedures are based on the following sources:

- USEPA SOP (EPA, 1986);
- USEPA's Procedures for Handling and Chemical Analysis of Sediment and Water Samples (EPA, 1981);
- USACE Sample Handling Protocol for Low-, Medium-, and High-Concentration Samples of Hazardous Waste (USACE, October 1986); and
- Fort Bliss RCRA Facility Investigation Work Plan, (ESE, March 1990 and ESE, September 1991).

Critical objectives for each field team member responsible for sample collection were:

- To collect a sample that was representative of the matrix being sampled, and
- To maintain sample integrity from the time of sample collection to the time of sample receipt by the laboratory.

In addition to locations specified in the work plan, the actual field selection of sample locations was determined by using the following criteria: visible signs of contamination (i.e., stained soils, stressed vegetation, drainage pathways, etc.); distribution of known areas of contamination; location of fill areas; and location of areas where subsidence has taken place. If there were no obvious signs of contamination, a reasonable number of samples were collected in order to determine the presence and extent of the potential contamination.

2.2.1 SOIL SAMPLING PROGRAM

The following sections describe the actual field methods used to collect the samples at the SWMUs investigated during the RFI.

2.2.1.1 Hand-Auger and Scoop Methods

For the purpose of this investigation, shallow soils (generally considered to be those soils within the depth interval 0 to 3 ft) were sampled using hand-auger and/or scoop methods. Equipment used during the collection of the shallow soil samples included:

- PID/FID;
- Stainless steel bucket augers;
- Stainless steel knives and/or scoops;
- Stainless steel bowls;
- Sample containers and labels;
- Ice;
- Shipping coolers and packing material;
- Decontamination equipment;
- Field log book;
- Chain-of-custody forms;
- Disposable gloves; and
- Trash bags.

Typical sampling activities proceeded in accordance with the following steps. Variation in these procedures may have occurred due to site-specific factors.

1. Upon arrival at the site, the field team set up the decontamination station and support area at locations in close proximity to the site.
2. All field equipment was decontaminated in accordance with the approved decontamination procedures outlined in Section 2.5. The sampling equipment was decontaminated after each sample collected, unless disposable sampling equipment was used. In this

latter case, equipment was discarded after each sample. All sampling equipment, samples and sample containers were handled with disposable protective gloves.

3. All sample containers were prepared and labeled.
4. Shallow soil samples were collected from areas where visible signs of contamination were present, or at pre-selected sampling locations. A clean stainless-steel hand auger or scoop was used to obtain the samples from 0-3 ft depths.
5. The sample was extracted from the auger using a clean stainless steel scoop. Extreme care was taken not to agitate the sample until the volatile organic compound (VOC) fraction had been collected.
6. The VOC fraction was collected into the prescribed sample container. This sample was then stored on ice for preservation prior to analysis.
7. Once the VOC fraction had been collected, the remaining material was then placed into a stainless steel bucket and homogenized (thoroughly mixed).
8. A sample was taken from the homogenized material within the bucket and placed into the appropriate sample container(s).
9. After the composite sample was collected it was placed on ice for preservation prior to shipment to the laboratory.
10. Chain of custody was maintained for each sample collected.
11. All field activities were recorded in the field log book.

2.2.1.2 Hollow-Stem Auger Method

Deep soil samples (greater than 3 ft depth) were collected with the aid of a Mobile B-53 drilling rig. Raba-Kistner Consultants, Inc. of El Paso, Texas were contracted to perform the drilling procedures. A hollow-stem auger was used to advance all soil borings to the desired sampling intervals. Once the desired

interval had been reached, a clean split-spoon sampler was driven into the ground to collect the soil sample. Equipment used during the collection of the deep soil samples are similar to those listed above with the addition of the split-spoon samplers.

Typical sampling activities proceeded in accordance with the following steps. Variation in these procedures may have occurred due to site-specific factors.

1. Upon arrival at the site the field team set up the decontamination station and support area at locations in close proximity to the site.
2. All field equipment was decontaminated in accordance with the approved decontamination procedures in Section 2.5. The drill rig and associated equipment was deco .aminated between each borehole. The split-spoon samplers were decontaminated prior to the collection of each sample.
3. All sample containers were prepared and labeled.
4. Each split spoon was driven 18 inches using Standard Penetration Test (SPT) protocols specified by the American Society for Testing and Materials (ASTM). Continuous samples were obtained while visual indications of contamination were present. When visual signs of contamination were no longer present, sampling was conducted in 5-ft intervals until head space analysis of the soil samples indicated that no further volatile organic contamination was present. As a result, the total depth of the borings was determined by field conditions.
5. After the collection of samples was completed, each boring was abandoned by filling with grout. The grout was pumped into the boring through the auger during auger removal.
6. All drill cuttings were placed into drums located by the abandoned boreholes at each site.

7. A stainless steel scoop or knife was used to extract the material from the split spoon. The VOC fraction was collected first. Care was taken to prevent excessive agitation of the material until the VOC fraction had been collected.
8. Once the VOC fraction had been collected, the remaining material was then placed into a stainless steel bucket and homogenized.
9. A sample was taken from the homogenized material within the bucket and placed into the appropriate sample container.
10. Once the sample was placed in properly marked sample containers, it was put on ice to preserve the sample prior to shipment to the laboratory.
11. The proper chain of custody was maintained for each sample collected.
12. All field activities were recorded in the field log book.

2.2.1.3 Backhoe Sampling

Deep soil samples (greater than 3 ft depth) were also collected with the aid of a backhoe. The backhoe was used to excavate trenches to the desired sampling intervals. Once the desired intervals were reached, the samples were collected with a stainless steel scoop either from the trench or from the bucket of the backhoe depending on the depth of the sampling interval. Typical scoop method sampling activities are described in Section 2.2.1.1.

2.2.2 WIPE SAMPLING PROGRAM

Wipe sampling was performed on internal construction materials. Sampling locations were chosen from wall and floor locations based on the likelihood of maximum contamination. The exact sampling locations were documented in the field note book and are discussed in Section 3.0. Equipment used during wipe sampling included:

- PID/FID;

- Vials with glass fiber filters;
- Sample containers;
- Shipping coolers and packing material;
- Ice;
- Field log book;
- Chain-of-custody forms;
- Disposable gloves; and
- Trash bags.

The following methodology was used to collect the wipe samples, adapted from the Occupational Safety and Health Administration (OSHA) (1984).

1. A clean impervious set of disposable gloves was used for each individual sample.
2. A glass fiber filter was removed from its storage vial. The filter was pre-soaked with methylene chloride as a solvent.
3. 100 square centimeters (cm^2) of the surface was sampled by wiping with the filter.
4. Without allowing the filter to contact any other surface, the filter was folded with the contaminated side inside, then folded over again. The filter was then placed in an appropriate sample vial. The vial was closed and labeled appropriately.
5. At least one blank filter treated in the same fashion (without wiping) was submitted for analyses for each sampled area.
6. The samples were placed on ice for preservation prior to laboratory analysis.
7. The proper chain of custody was maintained for each sample collected.
8. All field activities were recorded in the field log book.

2.2.3 WOOD SAMPLING PROGRAM

Bulk samples of construction materials were collected to determine concentrations of contaminants which may have penetrated the surfaces. Bulk samples of wood, sheet rock. vinyl tile and related materials were collected using a 1-in diameter coring drill bit. Wood samples were collected from the exact locations where surfaces had been cleaned during wipe sampling. This procedure was used to minimize the possibility that surface contamination would effect the results of the wood sampling effort. Equipment used during wood sampling is the same as equipment listed in Section 2.2.3.

The following methodology was used to collect the samples of construction materials.

1. The drill bit was decontaminated according to the procedures specified in Section 2.5.
2. A 1-in diameter hole was drilled up to 1 1/2-in deep.
3. Using a pair of clean and impervious gloves, the borehole shavings were collected and placed into the appropriate sample containers.
4. The sample containers were labeled and put on ice for preservation prior to shipment to the laboratory.
5. The proper chain of custody was maintained for each sample collected.
6. All field activities were recorded in the field log book.

2.2.4 OIL SAMPLING PROGRAM

Oil samples were obtained using a PVC disposable bailer. The top was cut off the bailer and it was shoved, top end down, into the very viscous oil. This technique was used to insure all oil horizons were sampled. The oil was poured from the bailer into appropriate sample containers. A more detailed discussion of the SWMU from which the oil was collected is presented in Section 3.0. Equipment utilized for sampling is similar to that which is listed in the preceding

sections.

2.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Field QA/QC inspections were conducted on May 9-11, May 21-24 and June 19-21, 1990 by USACE QA personnel. Observations made during the inspections were noted and reported to the ESE field team leader.

Split and field duplicate samples were collected to assure the accuracy of the sampling and analytical procedures. Split samples were placed within containers supplied by the USACE Missouri River Division Laboratory and shipped via Federal Express to the USACE QA Laboratory. Field duplicate samples were separately identified as such and shipped, via Federal Express, along with the project samples to the ESE laboratories in Gainesville, Florida and St. Louis, Missouri. Split and field duplicate samples were collected at a frequency of one in ten samples during the entire RFI sampling effort. Travel or trip blanks prepared by the ESE laboratory accompanied all shipments of samples being analyzed for volatile organic compounds (VOC).

2.4 SAMPLE PREPARATION AND PACKAGING

All sample labeling, preservation, preparation and shipment was accomplished according to the project work plan and Quality Control Plan (QCP) requirements. In all cases samples were packaged and shipped on the same day that they were collected. The standard preparation and packaging procedures used during the RFI were as follows:

1. Coolers to be shipped were cleaned before use.
2. Sufficient ice was placed inside two layers of new trash bags, tied off and placed in the cooler.
3. Before labeling, sample containers were cleaned of all gross contamination.
4. Samples were labeled according to QCP requirements.

5. Sample containers were wrapped individually with bubble wrap.
6. Wrapped sample containers were placed in the cooler on top of ice and bubble wrap.
7. Bubble wrap was stuffed in all voided areas of the cooler.
8. A chain-of-custody form was placed inside a Ziplock bag and taped to the inside of the cooler lid.
9. The cooler was securely closed with duct tape.
10. Evidence tape was placed on all four sides of the cooler lid, initialed and dated.
11. After insuring proper cooler labeling (e.g., "This Side Up" and "Fragile"), the cooler was shipped via Federal Express.

USACE sample preparation procedures were identical to those used for ESE samples; however, in addition, strapping tape was placed on all soil sample lids and USACE analysis tags were tied to each sample container.

2.5 DECONTAMINATION

Procedures for decontamination of the drilling and sampling equipment and PPE are discussed in the following sections.

2.5.1 BACKHOE, DRILL RIG, AND RELATED EQUIPMENT

Prior to any trenching or drilling activities the backhoe, drilling rig, and downhole tools and equipment were steam cleaned with potable water. In addition, the backhoe bucket, auger stem, and bits were scrubbed with wire and nylon brushes using Alconox detergent and potable water. The backhoe bucket, auger stem, and bits were again steamed cleaned and inspected for traces of soil, grease or other contaminants. This decontamination procedure was repeated between each borehole and trench. All decontamination of equipment took place on temporary decontamination pads set up at each SWMU which required drilling or trenching. These pads were constructed of 4-in x 4-in timbers and

20-ml plastic. All decontamination fluids were allowed to evaporate from the pads and the plastic was containerized in approved waste drums.

2.5.2 SAMPLING EQUIPMENT

Prior to any sampling activities and between sampling events, all sampling equipment including split-spoon samplers, hand augers, scoops, knives, drill bits and spoons were thoroughly decontaminated. The decontamination procedure used is listed below.

1. Alconox and potable water scrub with brush to remove gross contaminants,
2. Rinse with potable water,
3. Rinse with deionized water,
4. Rinse with methanol,
5. Allow to air dry,
6. Rinse with deionized water, and
7. Wrap completely in aluminum foil for transport or storage.

During the sampling at SWMUs #50 and #63, a hexane rinse was added prior to the methanol rinse. This was required to ensure thorough removal of the non-water soluble herbicide and pesticide compounds which may have been present at these sites.

2.5.3 WORK ZONES AND PERSONAL DECONTAMINATION

Work zones and decontamination procedures were established in accordance with ESE's standard operating procedures. These zones and procedures were modified to fit field conditions present at each site. Personnel were not allowed to leave the site prior to decontamination. Procedures used for personal decontamination were as follows:

1. Tools, monitors, sample containers, and trash were dropped at designated drop stations.

2. Feet were scuffed in designated shuffle pit areas to remove gross amounts of dirt from outer boots. If necessary, boots were washed down with soap and water in designated wash pit area.
3. Tape was removed from boots, and boots were removed. Tape was discarded in disposal container.
4. Hard hat (if worn) was removed and placed in the designated area.
5. Disposable coveralls, if used, were removed and discarded in appropriate containers.
6. Gloves were removed and placed in containers.
7. Respirator (if worn) was removed and placed in designated area for cleaning.

Disposable items such as Tyvek coveralls and Latex boot covers were used once and discarded in steel drums. Pressurized sprayers with soap and water were available in the decontamination area for washdown and cleaning of personnel, sample containers, and equipment.

3.0 FIELD INVESTIGATIONS

The field sampling investigations for each of the Fort Bliss facility SWMUs are presented in the following subsections. Analytical results for all of the samples collected are discussed in Section 4.0.

3.1 INTRODUCTION

The investigation of each SWMU is presented in the sequence outlined in the work plan and not in the order in which they were sampled. A chronological listing of field activities is documented on daily activity summary forms attached as Appendix A to this report. All field investigations were performed by ESE personnel between May 9 and June 21, 1990 and between October 28 and 31, 1991.

The descriptions of each SWMU include the location, type of unit, unique features and all sampling performed. Deviations from the sampling scheme proposed in the work plan have been noted and explained. A summary of the proposed and accomplished sampling program is shown in Table 3-1. Methods of sample collection and equipment decontamination were previously discussed in Section 2.0. Figure 3-1 shows the regional location of the SWMUs within the Fort Bliss complex. Figures 3-2 through 3-4 present a more detailed topographical location for each of the SWMUs discussed in the preceding sections.

3.1.1 HEALTH AND SAFETY

The SSO was responsible for monitoring personnel during the course of daily sampling activities. A site safety meeting was held daily by the SSO and covered the following topics: (1) protection levels; (2) site-specific hazards and possible contamination routes; (3) personal hygiene; (4) weather information; and (5) emergency procedures. Certification of appropriate health and safety training,

TABLE 3-1
FORT BLISS SITE INVESTIGATION
SAMPLING SCHEME

SWMU #	SWMU Description	Proposed Deep Boring	Proposed Shallow Boring	Proposed Surface Sample	Proposed Surface Water	Proposed Sediment	Proposed # of Env. Samples ESE	Proposed # of Env. Samples COE	Accomplished Deep Boring	Accomplished Shallow Boring	Accomplished Surface Sample	Accomplished Surface Water	Accomplished Sediment	Accomplished # of Env. Samples FSE	Accomplished # of Env. Samples COE
(4B)	Inactive Landfill #2 - Small Oil Pit		3				6	1	3					6	1
4C	Landfill #2 Large Oil Pit			3 (oil)			3	1			2 (oil)			2	1
15	Rubble Dump Spill Site			8			8	1			7			7	1
30	Hazardous Waste & PCB Storage Facility		3				3	1		3				3	1
63	Herbicide Storage & Mixing Area			7			7	1			6			6	1
			4 (wood)				4	0		4 (wood)				4	0
				5 (wipe)			5	0			5 (wipe)			5	0
1A	Active Landfill - Large Grease Pit	7					14	1	5 (sampled)					10	1
1B	Active Landfill - Small Grease Pit	6					12	1	6 (sampled)					12	1
(4A)	Inactive Landfill #2 - Large Oil Pit	4		3			17	1	4		0			8	1
50	Pesticide Storage Area	3					9	1	3					9	1
				6			6	1			6			6	1
45	Storm Drainage System	4					12	1	4					12	1
39	NCO Academy Oxidation Lagoon	7					21	2	7					21	2
					6		6	1				0		0	0
						6	6	1					0	0	0
	NCO Academy Oxidation Lagoon-Background	1					5	1	1					5	1

TABLE 3-1 (Cont.)
FORT BLISS SITE INVESTIGATION
SAMPLING SCHEME

SWMU #	SWMU Description	Proposed: Deep Boring	Proposed: Shallow Boring	Proposed: Surface Sample	Proposed: Surface Water	Proposed: Sediment	Proposed: # of Env. Samples ESE	Proposed: # of Env. Samples COE	Accomplished: Deep Boring	Accomplished: Shallow Boring	Accomplished: Surface Sample	Accomplished: Surface Water	Accomplished: Sediment	Accomplished: # of Env. Samples ESE	Accomplished: # of Env. Samples COE
31	Old Fire Fighting Training Area	3	3	3			9	1	3	3	3			9	1
--	Decon Wastes						5	0						0	0
Totals							158	17						125	15

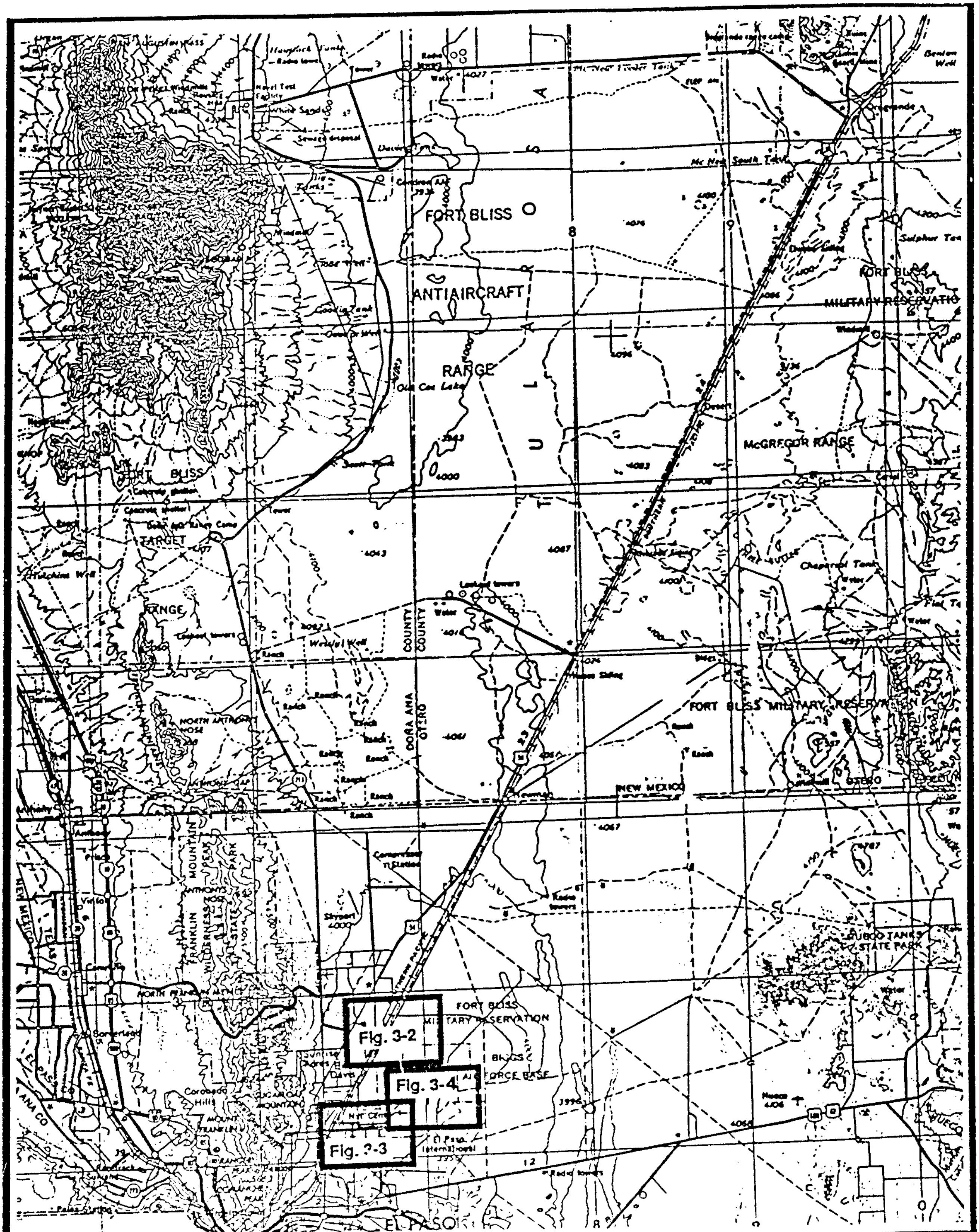

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Figure 3-1
RCRA Facility Investigation Site Locations
Scale: 1" = 4.7 miles (1:300,000)
Source: USGS 1X2 degree sheets - NH 13-1 and NH 13-10, 1973

Drawn By CSJ	Date JULY 1990	Checked by	File: FBReg2

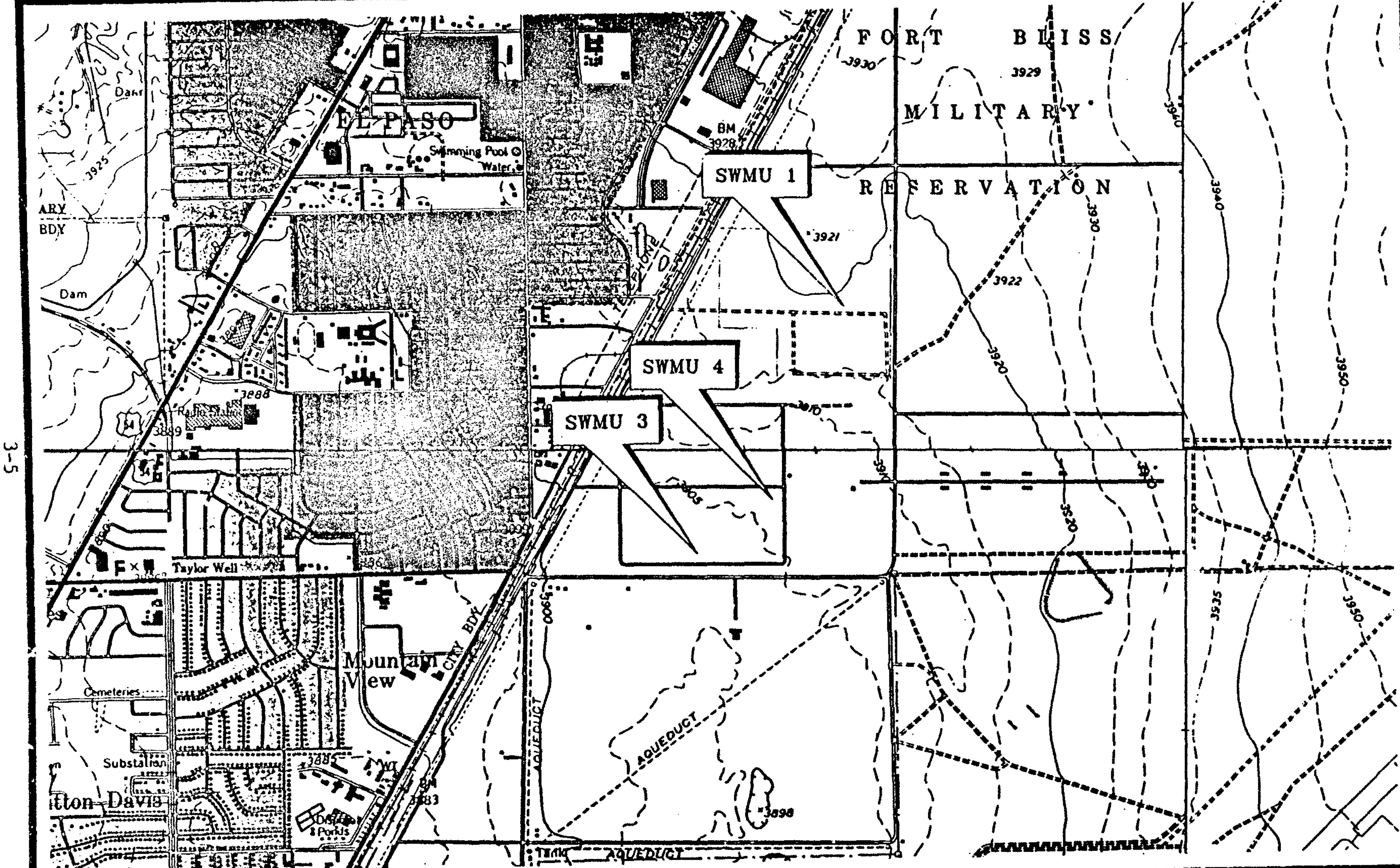

Figure 3-2
SWMU 1 – Grease Pits at Active Landfill
SWMU 3 – Inactive Landfill
SWMU 4 – Oil Pits at Inactive Landfill
Scale: 1"=2000'
Source: USGS 7.5' Quad. – El Paso & N. Franklin Mtn., TX, 1973

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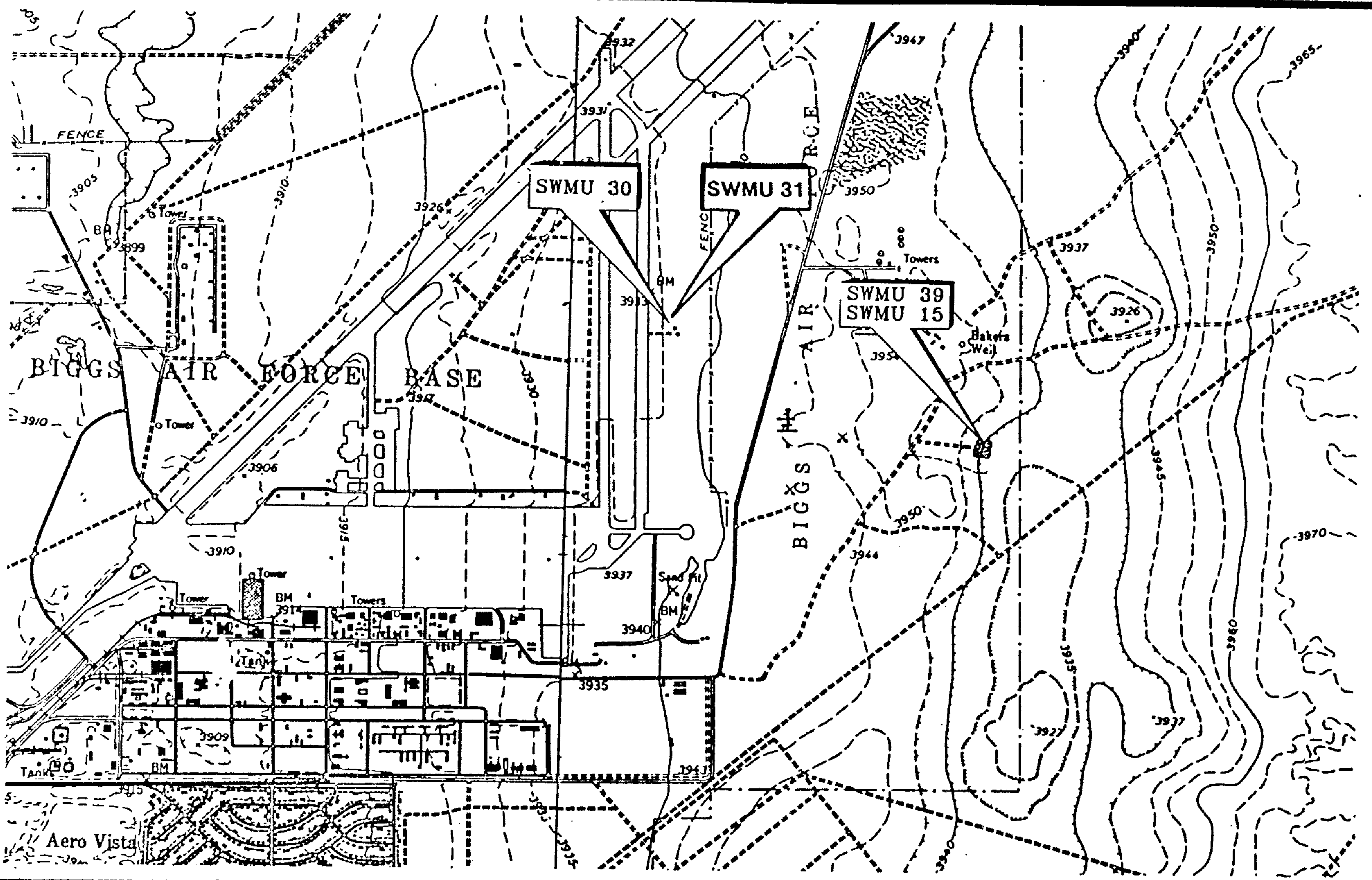

ESE Environmental Science & Engineering, Inc. A CILCORP Company ENGLEWOOD, COLORADO 80112	Figure 3-3 Scale: 1"=2000' SWMU 39 – NCO Oxidation Lagoon SWMU 15 – Rubble Dump Area SWMU 30 – PCB Storage Area **SWMU 31 Old Fire Fighting Area**	FORT BLISS EL PASO, TEXAS Drawn By: GSJ Date: JULY 90 Checked by: File: FB39

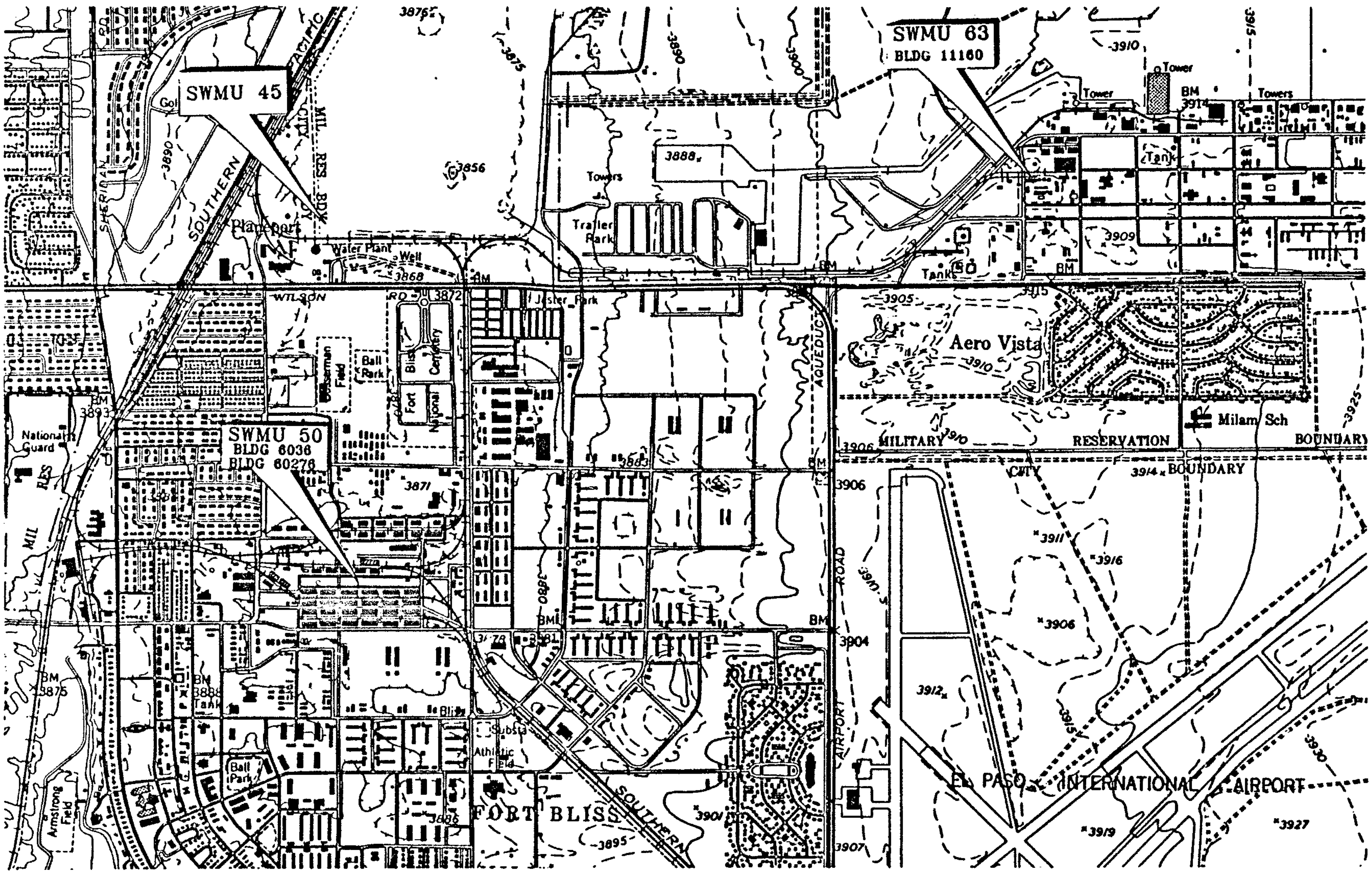

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Figure 3-4
SWMU 45 – Stormwater Impoundment Area
SWMU 50 – Pesticide Storage Area
SWMU 63 – Herbicide Storage Area
Scale: 1" =2000'
Source: USGS 7.5' Quad. – El Paso, TX, 1973

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medical monitoring and respirator fit testing was collected by the SSO from all personnel. Several copies of the site safety and health plan (SSHP) were available on site, and all personnel were required to be familiarized with the document prior to initiating any sampling activities.

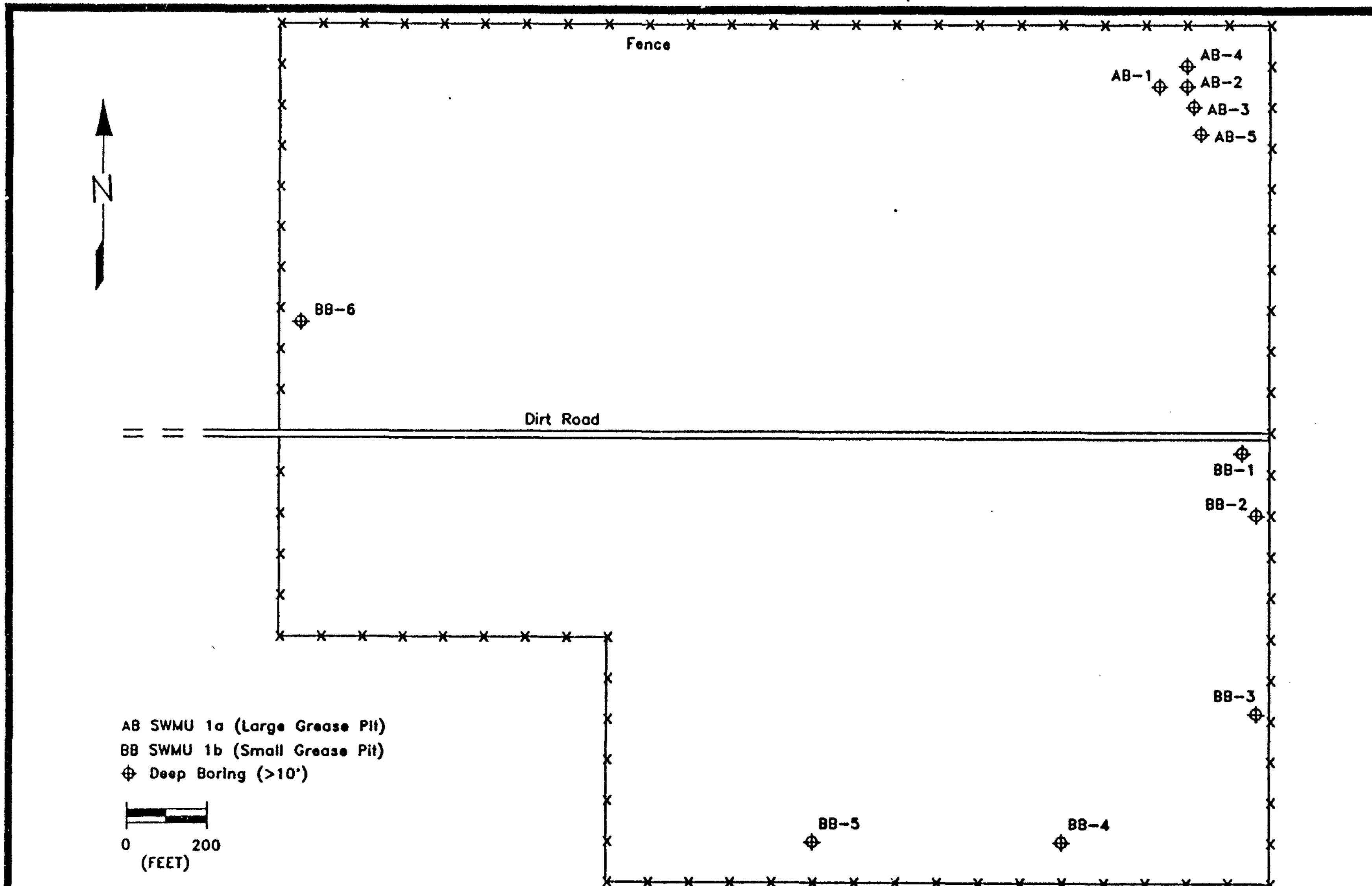
3.1.2 PRE-INVESTIGATIVE PROCEDURES

Prior to the initiation of daily field sampling, the following activities were performed: (1) logistical preparation and equipment mobilization; (2) notification of the proper authorities as to sampling location and intentions; (3) performance of a site safety meeting by the SSO with all sampling personnel; (4) calibration of air monitoring equipment; and (5) evaluation of weather information.

3.2 SWMU #1, SANITARY LANDFILL NO. 1 (ACTIVE)

The location and dimensions of SWMU #1 are shown in Figure 3-5. This trench-and-fill landfill encompasses approximately 106 acres and has been operating since 1974. The landfill was utilized for disposal of municipal refuse, pathological incinerator ash, pathological wastes, and asbestos waste. Listed hazardous wastes may also have been disposed here. The refuse was compacted and covered daily (USAEHA, 1988). It was reported that two rectangular grease pits were located within the landfill area along the eastern boundary. These pits were used for disposal of waste oils from 1974 to 1978. One of the pits was thought to be appreciably larger than the other. Both of the pits have been covered over with backfill.

In accordance with the work plan, ESE surveyed the approximate locations of the pits utilizing information received from the landfill office. The large and small grease pits are herein designated as SWMU 1a and SWMU 1b, respectively. The objectives of sampling at these two pits included locating and delineating the size of the grease pits, as well as assessing the possible extent of subsurface



ESE Environmental Science & Engineering, Inc. ENGLEWOOD, COLORADO 80112 A CILCORP Company	Figure 3-5 ACTIVE SANITARY LANDFILL - SWMU 1a and 1b	FORT BLISS EL PASO, TEXAS Drawn By: GSJ / Date: JULY 90 Checked by: / File: bliss1

contamination. The suspected locations of SWMU 1a and SWMU 1b grease pits and the soil borings completed are shown in Figure 3-5. Sampling efforts were performed in Level D protection.

3.2.1 SWMU 1a

Nine boring attempts were made in the area of SWMU 1a. Five borings (AB-1 through AB-5) were advanced to completion. Four borings were abandoned upon encountering landfill refuse.

3.2.2 SWMU 1b

Seven borings were attempted in the area of SWMU 1b. Borings BB-1 through BB-6 were advanced to completion. One boring was abandoned upon encountering refuse. Borings BB-1 and BB-2 at SWMU 1b did not encounter grease, nor were there any visible signs of grease or waste oils. Therefore, after consultation with Fort Bliss facility and Corps of Engineers personnel, the remaining four borings were relocated along the east, south and west perimeters of the sanitary landfill in an attempt to determine the presence of any leachate.

3.2.3 DESCRIPTION OF FIELD INVESTIGATION

Continuous split-spoon sampling was performed from the surface to directly below the natural soil interface at all boring locations at SWMU 1a and SWMU 1b. The depth to natural soil varied between 8 ft and 17 ft below ground surface. There was no visible evidence of grease or waste oil found. Headspace measurements for organic vapors were performed continuously on the split spoon barrels. Organic vapor readings above background levels were due to asphalt and refuse returned in the drill cuttings. Samples taken for laboratory analysis were obtained at the 5-ft and 10-ft intervals below the depth at which natural soil was encountered. The boring logs for SWMU #1 are included as Appendix C to this report.

3.3 SWMU #3, SANITARY LANDFILL NO. 2 (CLOSED)

This trench-and-fill landfill was in operation from 1957 to 1974 and covers approximately 101 acres. The general location of SWMU #3 within the Fort Bliss complex is shown in Figure 3-2. Solid wastes disposed of in this landfill were reportedly similar to those placed in SWMU #1.

In accordance with the work plan, no environmental samples were collected at SWMU #3. The objective of the investigation was to evaluate materials contained in the landfill. This was performed through the excavation of materials in five shallow trenches located at the southern (downgradient) end of the fill cells.

SWMU #3 consists of 18 north-south trending fill cells which are approximately 50 ft in width and over 1000 ft in length (Figure 3-6). In the field, the fill cells were consecutively numbered, one (1) to eighteen (18), from west to east. Excavation locations were selected with a random number generator and were situated at the southern end of cells eight (8), four (4), seven (7), two (2) and eleven (11). The excavation trenches were numbered from one (1) to five (5) and excavated from east to west, to avoid confusion with refuse cell numbers.

Air monitoring was performed continuously during the trench excavation operations using an OVA. Organic vapors were not encountered above background levels. Protection level D was recommended in the work plan; however, level C protection was initially donned due to the possibility of contaminant and dust inhalation during excavation procedures. Protection was downgraded to level D after excavation of trench #2 due to the lack of any visible airborne contaminants and organic vapors above background levels.

Excavation was advanced to a depth of 10 ft in all trenches using a hydraulic backhoe. There was no visible evidence of contamination such as staining or

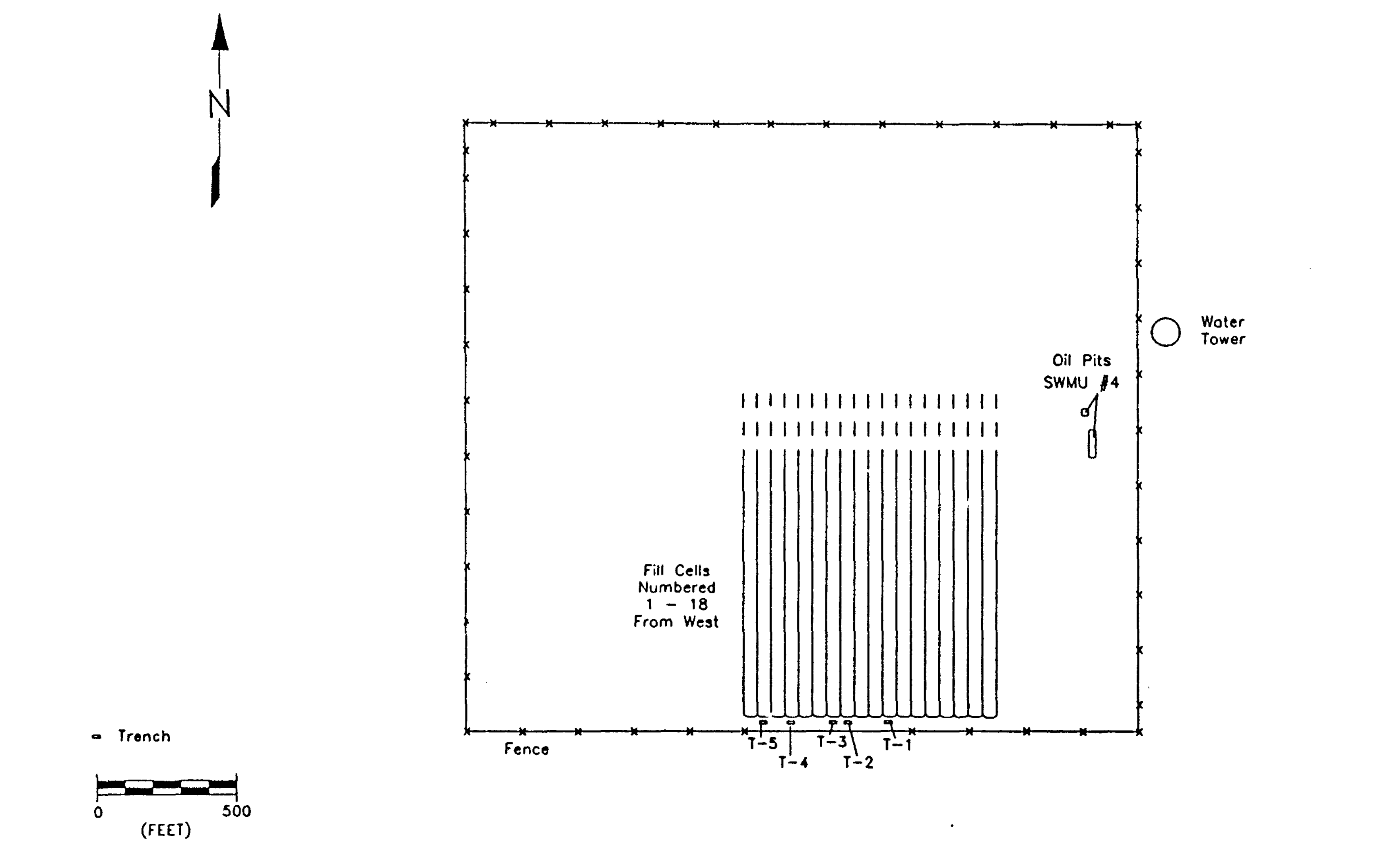


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Figure 3-6
CLOSED SANITARY LANDFILL - SWMU 3

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mottling. Soils in this area consisted of silty sands of varying colors. Caliche layer(s) were found in all trenches at the following depths: Trench #1 at 6-7 ft; Trench #2 at 5-6 ft; Trench #3 at 3-4 ft; Trench #4 at 2-3 ft and at 8-9 ft; and Trench #5 at 1-2 ft and at 5-6 ft. The trenches were backfilled with in situ material following excavation. Detailed soil logs for the trench excavation operations in SWMU #3 are included as Appendix C to this report. Appendix G presents pictures of the trenching activities.

3.4 SWMU #4, OIL PITS AT SANITARY LANDFILL NO. 2 (CLOSED)

SWMU #4 consists of several rectangular pits located near the eastern edge of the landfill. Two of these pits contain residues of materials suspected to be waste oils (USAEHA, 1988). Locations of the pits are shown relative to SWMU #3 in Figure 3-6. During a site visit in January 1989, the liquid level in the large pit was approximately 6 ft below grade; however, the depth of the pit and hence the depth of the liquid, was undetermined at that time. During a July 1989 site visit, a dried residue was observed in the smaller pit.

In accordance with the work plan, ESE located boring and liquid sampling locations inside of and surrounding the pits. The large and small pits are herein designated as SWMU 4a and SWMU 4b. The objectives of sampling at these two SWMUs included identifying the liquid contained in SWMU 4a, identifying the residue contained in SWMU 4b, and assessing the possible extent of subsurface contamination surrounding the pits. The sampling and the health and safety procedures performed at SWMU 4a and SWMU 4b are significantly different from one another and will be discussed separately.

3.4.1 SWMU 4a, LARGE OIL PIT

SWMU 4a measures approximately 90 ft by 30 ft, and trends east-west. Pit dimensions are shown to scale in Figure 3-7. Borehole sampling locations (S4A-B1, S4A-B2, S4A-B3, and S4A-B4) were selected and sampled as per the work

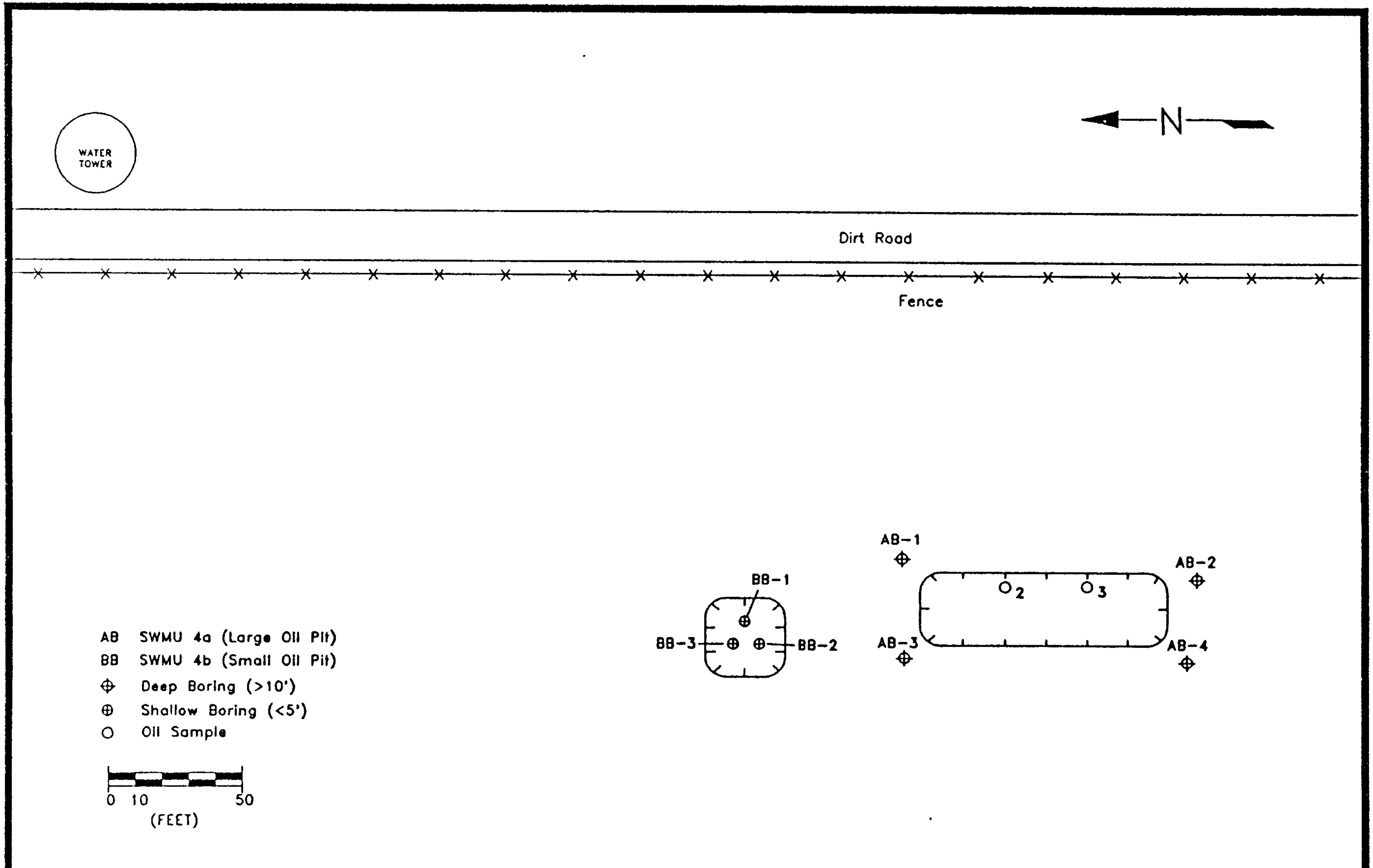

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Figure 3-7
OIL PITS AT CLOSED SANITARY LANDFILL - SWMU 4a and 4b

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plan. Sampling inside the pit was proposed at three separate locations. At each location one oil sample and three soil samples were to be collected. Actual sampling within the pit included the collection of a composite oil sample at two locations. Soil sampling below the oil was not accomplished due to the thickness of the oil layer.

3.4.1.1 Oil Sampling

Sampling of the oil and sediments in the pits was discussed at length in the work plan and several investigative methods were suggested. An initial pit survey at protection level B was therefore performed to ascertain how sampling should proceed. The pit surveyor was supported by a harness and lifeline upon entering the pit. OVA readings were not obtained above background levels in the breathing zone above the oil; however, readings up to 200 parts per million (ppm) were obtained directly above the oil surface. The material in the pit was probed with a shovel and was found to be extremely thick and globular. Firm bottom sediments were encountered from 2.5 ft to 4.5 ft below the oil surface.

Upon retreat from the pit, the following procedures were adopted:

1. The protection level was downgraded to level C modified. An air purifying respirator was substituted for the supplied air respirator. This downgrade was made in response to the air monitoring data collected from the pit survey.
2. Based on the ambient air temperature of 102°F and 100% sunshine, the work periods were to be no more than 10 minutes in duration at level C modified protection. Body temperature monitoring was conducted during rest periods.
3. Collection of sediment samples from below the oil under existing field conditions could not be accomplished.

4. Oil sampling was limited to two locations inside the pit. A composite sample of the oil at different depths was collected using a disposable PVC bailer.

Composite oil samples were collected at locations #2 and #3 utilizing a PVC bailer. Sample collection with a coliwasa sampler was attempted without success due to the viscosity of the oil. The locations of the oil sampling points are shown in Figure 3-7.

3.4.1.2 Soil Borings

Air monitoring was performed continuously with an OVA during boring operations. Organic vapors were not detected above background levels. All activities were accomplished using level D protection.

At borehole S4A-B1, the auger stem was advanced slowly to approximately 7 ft. This depth corresponds to the approximate level of the oil surface in the pit. Continuous spoon sampling was accomplished to a depth of 11.5 ft (approximate base depth of oil), and a soil sample was collected in the 11.5 to 13 ft interval. Organic vapor screening of the sample yielded background levels. The auger stem was advanced to 18 ft and a second sample was collected in the 18.5 to 20 ft interval. Organic vapors were not detected above background levels in the cuttings or headspace of this sample. The boring was completed to 20 ft and abandoned. Borings S4A-B2, S4A-B3, and S4A-B4 were drilled, sampled, and completed in a simiiar manner as boring S4A-B1, with samples collected from each boring at two depths.

Soils in the area primarily consisted of brown well graded sands, silty sands, and clayey sands, commonly graded to gravels. Minor amounts of red clays and calcareous sands were also encountered. A well-developed caliche layer was

encountered in boring S4A-B2 at 7 ft to 9 ft. Detailed soil logs for SWMU 4a are included as Appendix C to this report.

3.4.2 SWMU 4b, SMALL OIL PIT

SWMU 4b measures approximately 30 ft by 30 ft and is located north of SWMU 4a (Figure 3-7). The pit has gently sloping sides which allowed easy access for sampling. As per the work plan, three locations were chosen for sampling inside the pit. The sampling points were staked and labeled as S4B-B1, S4B-B2 and S4B-B3.

It was reported that essentially similar materials were disposed of in SWMU 4a and SWMU 4b. Based on prior air monitoring results from SWMU 4a, it was decided that the initial level of protection at this site should be level C modified. Air monitoring was performed continuously and organic vapors in the breathing zone surrounding the pit were 3 ppm above background levels.

Two samples were collected at each location at depths of 4 in and 30 in using a steel shovel and a stainless steel spoon. OVA readings of sample headspaces ranged from 6 to 1000 ppm above background levels. Samples obtained from the 4 in depth were comprised of black/grey fibrous material and oily sediments. Samples obtained at the 30 in depth consisted of sandy, oily sediments. Complete descriptions of sample locations are included on Activity Reports which are included as Appendix A to this report.

3.5 SWMU #15, RUBBLE DUMP SPILL SITE

This site was incorrectly located in the work plan as being situated due east of the El Paso Airport. The site actually comprises the areas immediately surrounding SWMU #39 (NCO oxidation lagoon) and was located for ESE by the Fort Bliss Environmental Office. SWMU #15 consists of undeveloped desert area containing numerous piles of debris, rubble, furniture and household waste.

Previous site inspections have revealed discolored surface soils in at least two locations. The general location of SWMU #15 within the Fort Bliss complex is shown in Figure 3-3.

The objectives of the activities performed at SWMU #15 include the location and estimation of waste types and quantities, delineation of spill areas, and collection of surface soil samples from the suspected spill sites.

3.5.1 REFUSE CHARACTERIZATION

A walking survey was performed by ESE to characterize the types of materials located in the rubble dump. Activities were performed in level D protection. Additionally, snakeproof leggings were worn during the survey to guard against possible snake bites. Air monitoring was not required or performed for this phase of the survey.

A survey grid was established which consisted of 100 ft sections trending east and south of SWMU #39 (see Figure 3-8), covering approximately 400,000 square feet (ft^2). Materials contained in the rubble consisted of approximately 60-80% asphalt roofing shingles (with small amounts of associated drain pipe and gutters), concrete rubble (10%), asphalt pavement, and bricks. Minor amounts of possible asbestos material (approximately 5%), aluminum cans (1%), steel paint and oil buckets, burned wood, ashes and gravels (2-4%) were also present. Seven oil stained soil areas were identified during the walking survey as sampling locations (Figure 3-8). This figure also gives the dimensions of the extent of the visible rubble. An accurate quantification of the debris could not be made since the piles were spread about and amounts per pile were very variable. In addition, the debris appeared not to be the result of unauthorized dumping but rather, planned events.

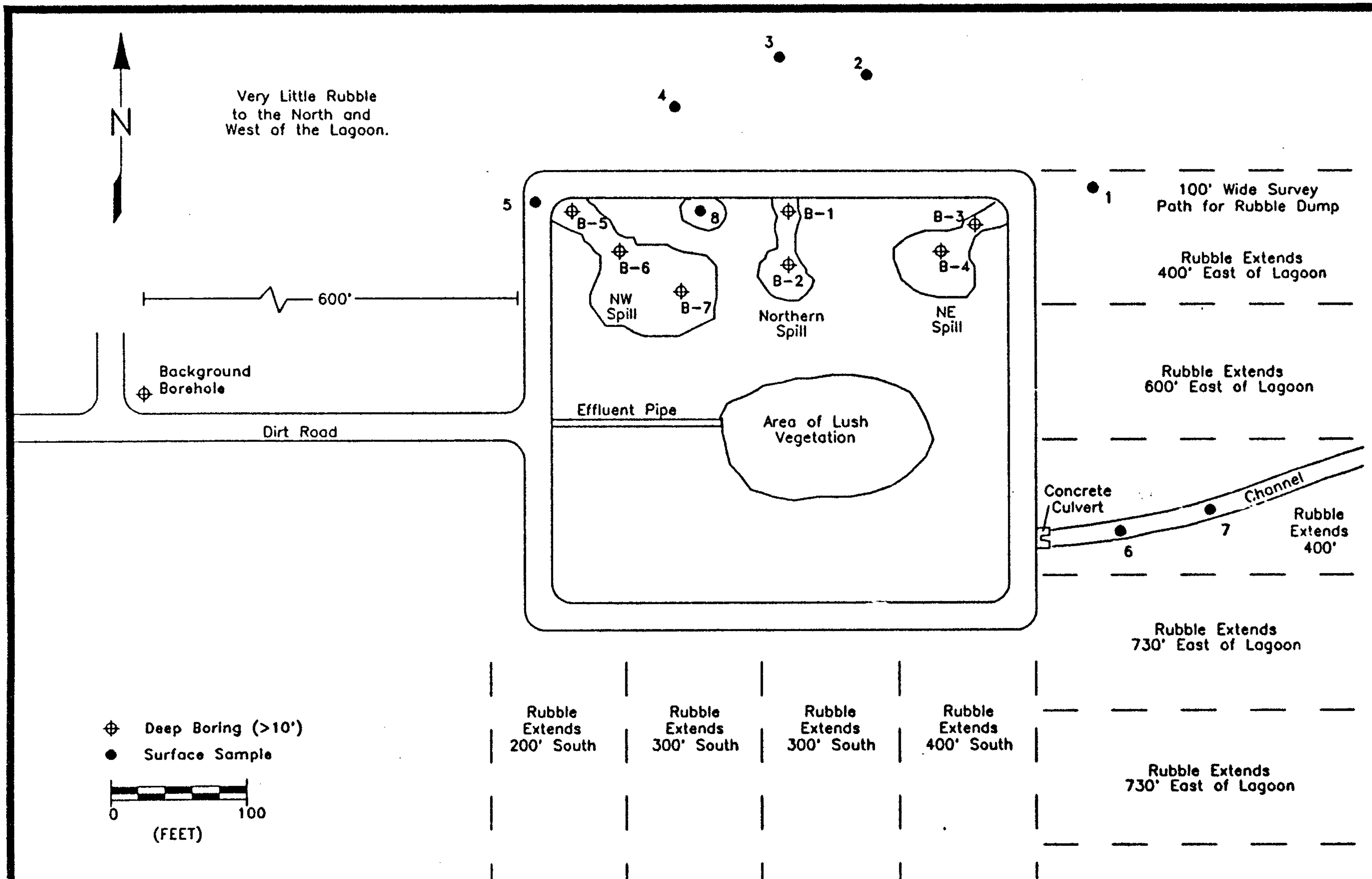

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Figure 3-8
RUBBLE DUMP SITE – SWMU 15
NCO ACADEMY OXIDATION LAGOON – SWMU 39

FORT BLISS
EL PASO, TEXAS

Drawn By:	GSJ	Date:	JULY 90
Checked by:		File:	bliss39

3.5.2 SOIL SAMPLING

Air monitoring was performed continuously using an OVA, and organic vapors were not encountered above background levels. Activities were performed in level D protection. Additionally, snakeproof leggings were worn during sampling activities to guard against possible snake bites.

Soil samples were collected from seven oil stained areas identified during the walking survey. Samples were collected with a stainless steel scoop from a depth of 0 to 6 in. At sample location SO-7, a second sample was obtained from a depth of 1 to 2 ft. Soils consisted primarily of light brown and brown stained, poorly graded, silty sands. The sampling locations are shown in Figure 3-8. Soil sampling forms for SWMU #15 are included in Appendix B to this report.

3.6 SWMU #30, HAZARDOUS WASTE AND PCB STORAGE FACILITY

SWMU #30 consists of the Fort Bliss hazardous waste facility, PCB storage facility and the adjacent yard. The general location of the site within the Fort Bliss complex is shown in Figure 3-3. Although transformers and related electrical equipment are typically stored within the PCB storage facility, electrical equipment with less than 50 ppm PCBs has been stored on the ground outside this facility (USAEHA, 1988). Additionally hazardous wastes have been stored just outside the storage building. During the January 1989 site visit, stained asphalt was observed at this storage site. Electrical equipment containing less than 50 ppm PCBs is not regulated by federal regulations under the Toxic Substances Control Act; however, the State of Texas regulations require cleanup of debris or soils containing greater than 1 ppm of PCBs.

The objectives of the activities performed at SWMU #30 included the delineation and sampling of the stained areas noticed within the SWMU during the January 1989 site visit.

Air monitoring during activities conducted at SWMU #30 was performed continuously with an OVA. Organic vapors were not encountered above background levels. The air monitoring forms are included as Appendix D to this report. Protection level D was recommended in the work plan; however, level C protection was initially donned due to the possibility of contaminated dust inhalation and skin contact while breaking through the asphalt with a pick-axe. Protection was downgraded to level D during actual sampling of the soil/sediment.

A walking survey performed by ESE personnel identified three areas of surface staining located on the asphalt surrounding the hazardous waste storage building. A fourth stained area was located adjacent to the south edge of the asphalt. Composite samples were collected to a depth of 3 ft at the three largest stained areas using a hand auger and stainless steel scoop. The locations of the stained areas and corresponding sample locations are shown in Figure 3-9.

Based on visual observations noted during sample collection, the soils in the area primarily consisted of brown, poorly graded, clayey sands. Soil staining (possibly from oil) was evident to an approximate depth of 1 ft. Soil sampling forms for SWMU #30 are included in Appendix B to this report.

3.7 SWMU #31, OLD FIRE FIGHTING TRAINING AREA

This site was labeled as SWMU-028 in the Draft Work Plan. This SWMU was used for fire training at Fort Bliss from 1971 to 1981 and covers approximately 3 acres (USAEHA, 1988). The location and dimensions of the site are shown in Figure 3-10. It is assumed that operations at this site were similar to those employed at the Biggs Army Airfield Fire Training Area. Therefore it is likely that waste fuels and other flammable substances had been burned at SWMU #31.

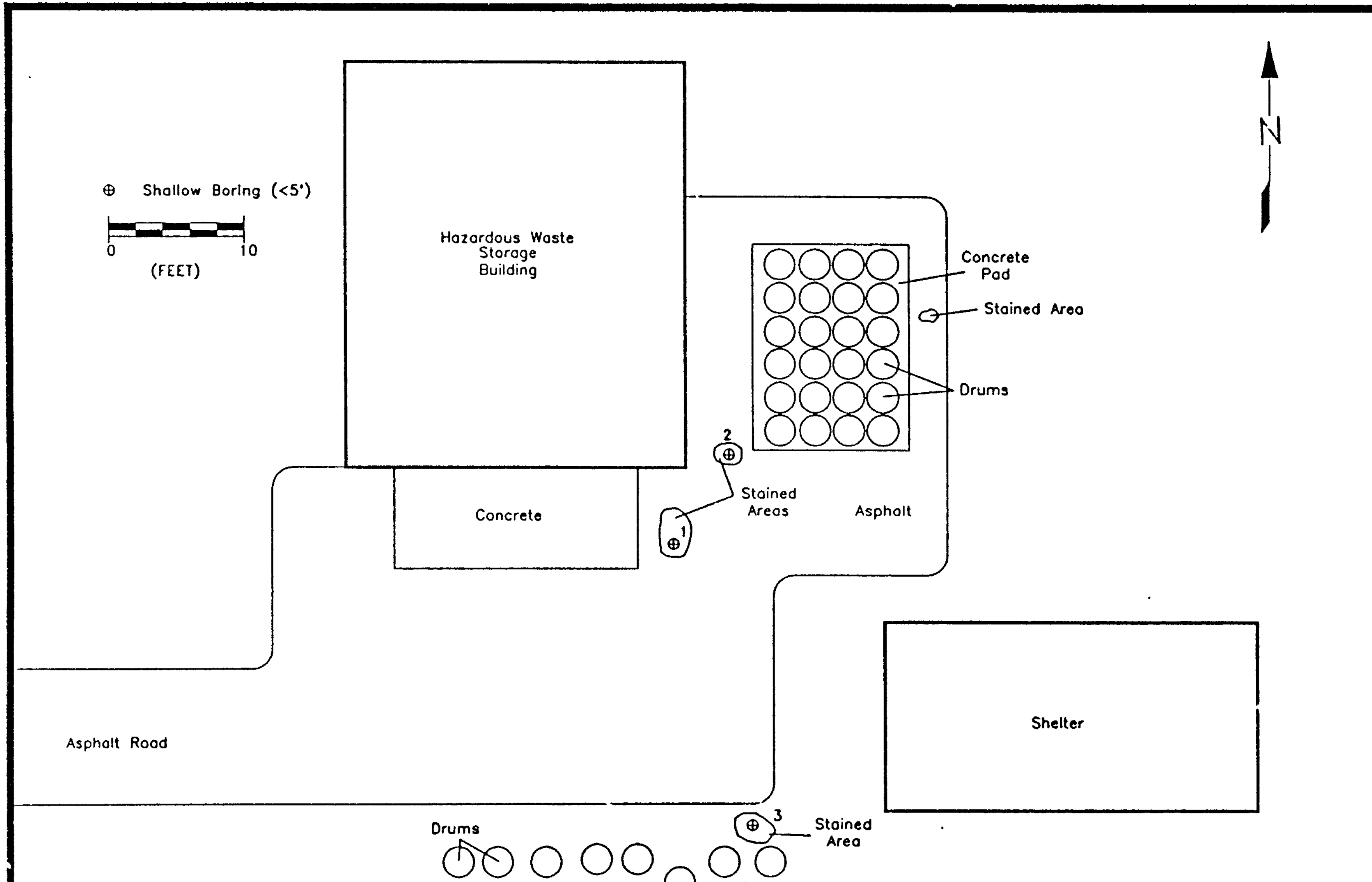

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Figure 3-9
HAZARDOUS WASTE AND PCB STORAGE FACILITY - SWMU 30

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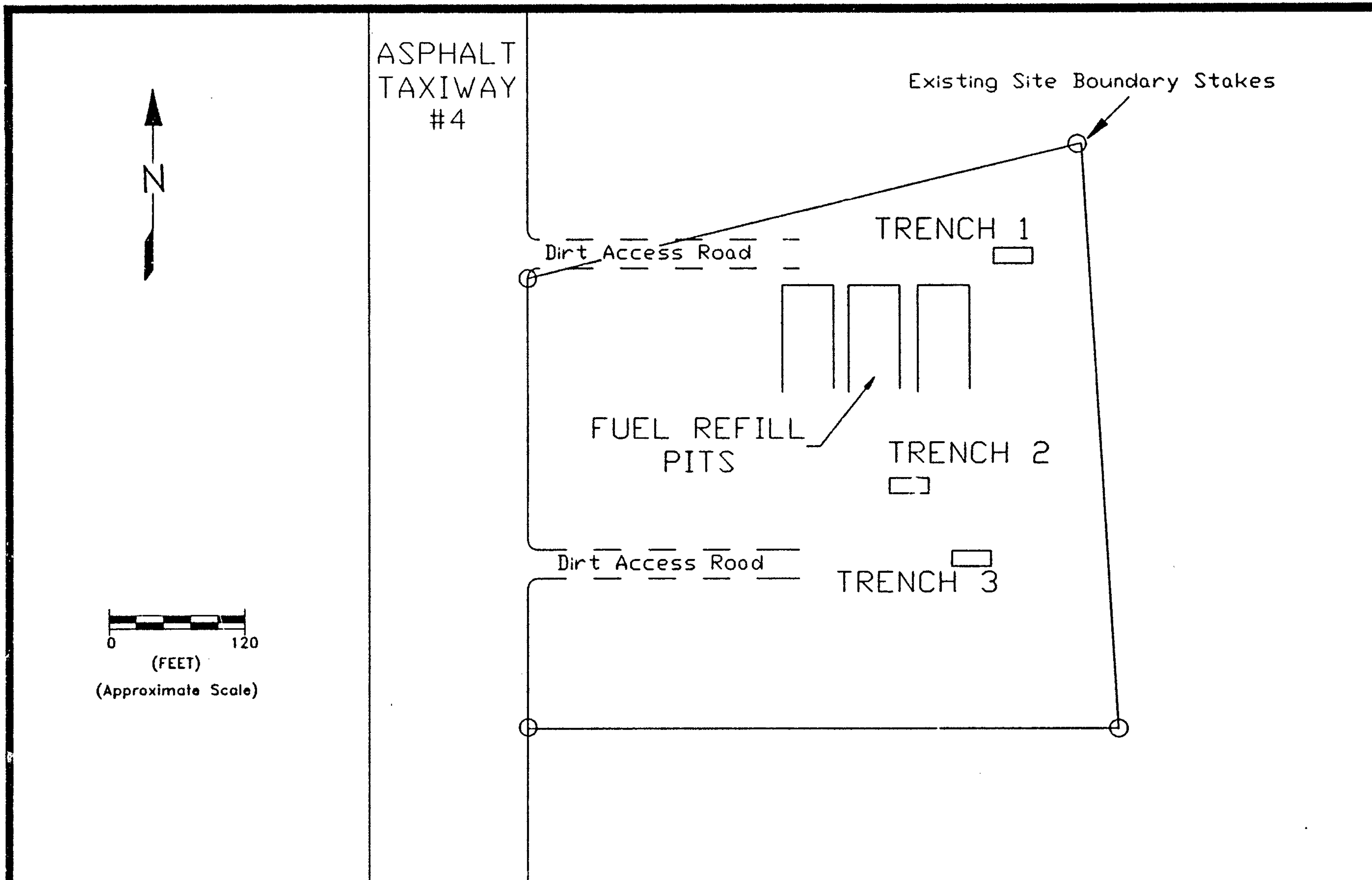

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Figure 3-10
OLD FIRE TRAINING AREA – SWMU31
Sampling Trench Locations

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EL PASO, TEXAS

Drawn By: LFV	Date: DEC 91
Checked by:	File: bliss31

The objective of the investigation was to conduct soil sampling via trenches excavated downgradient of three burn areas. Air monitoring was performed continuously with an HNU and organic vapors were not encountered above background levels. Air monitoring sheets are included in Appendix D. All activities were accomplished at protection level D in accordance with the work plan. Sampling activities are outlined below. Soil/sediment sampling forms are located in Appendix B of this report.

As per the work plan, Fort Bliss personnel assisted ESE in locating the site and in obtaining an excavation permit. A copy of the excavation permit is located in Appendix H. ESE personnel surveyed the locations for the proposed trenches next to the three most significant burn areas at the site. Trench locations and approximate site layout are shown in Figure 3-10.

Excavation was advanced to a depth of 6 ft in all trenches using a hydraulic backhoe. There was visible evidence of soil staining to a depth of 8 inches in Trench 1 and to a depth of 6 inches in Trenches 2 and 3. Soils in all trenches consisted of silty sands (SM) containing caliche mottling. Detailed soil logs are included in Appendix C and photographs are included as Appendix G.

Samples were collected from each trench at depths of 0 to 6 inches, 3 feet and 6 feet. Each sample was collected by hand using a new surgical glove, placed in the appropriate container(s), labeled and immediately placed in a cooler. HNU screening results of sample headspace were at background for all samples except for an approximate reading of 0.2 ppm on samples taken from Trench 1 at 0 to 6 inches, and at 6 ft. Air monitoring results are included on the boring logs and on the air monitoring data sheets.

3.8 SWMU #39, NCO ACADEMY OXIDATION LAGOON

Sewage generated at the NCO academy is piped to this unlined, earthen lagoon for evaporation (USAEHA, 1988). The general location of SWMU #39 within the Fort Bliss complex is shown in Figure 3-3. A review of aerial photographs from 1978 revealed that the lagoon had been filled at that time. During a January 1989 site visit, the lagoon contained standing water covering approximately 2,000 ft^2. A large area of fuel/oil stained soils was observed on the berm in the north-west corner of the lagoon. Ponded fuels were observed on the floor of the impoundment leading directly into the water within the lagoon. Used fuel filters and related equipment were also observed at this location during the site visit. A second smaller area of fuel staining was observed near the northeast corner of the lagoon during a site visit in July 1989. At that time, approximately 1,600 ft^2 of the lagoon contained surface water at a depth of 1 to 20 in. A third area of fuel staining was observed along the northern edge of the lagoon during a site visit in September 1989. Figure 3-11 shows the areas of staining in the oxidation lagoon.

The objectives of the activities performed at SWMU #39 included delineating surface spill contamination through the collection of subsurface soil samples and determination of the presence of contaminants in surface water and sediment samples. The sampling requirements outlined in the work plan included the collection of samples from seven boring locations within the three spill areas, one background borehole located outside the lagoon, and six surface water and sediment samples from standing water within the lagoon.

During the initial RFI site visit on June 14, 1990, standing water was not present in the lagoon; therefore, water and sediment samples could not be collected. An additional spill area was noticed at this time, located between the northern and

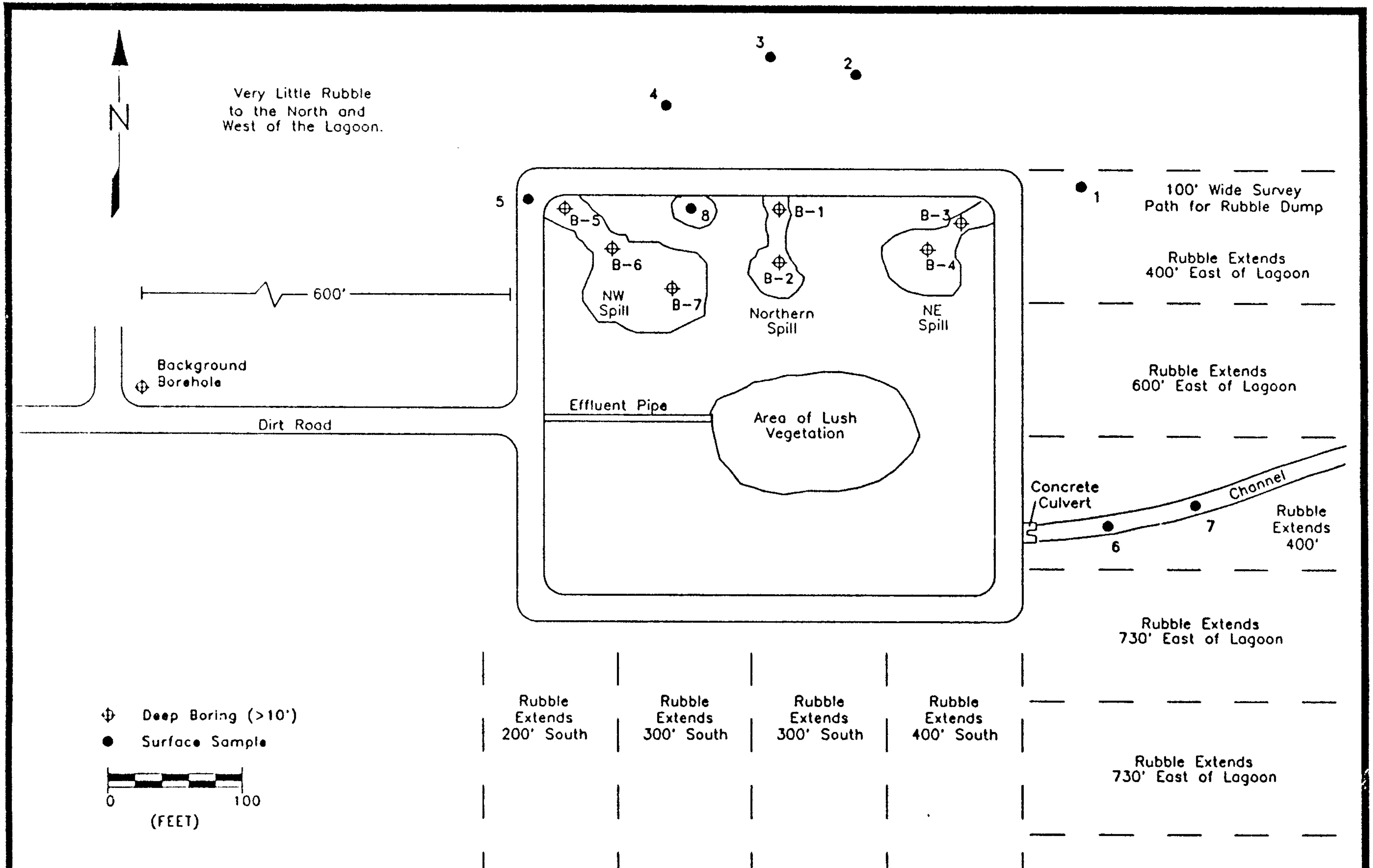

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Figure 3-11
RUBBLE DUMP SITE – SWMU 15
NCO ACADEMY OXIDATION LAGOON – SWMU 39

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northwestern spill areas. ESE and Corps of Engineer personnel decided to collect an additional surface soil sample. All boring locations were cited based on the work plan.

Air monitoring was performed continuously with an OVA or HNU, and values obtained above background levels are indicated in the following paragraphs. All sampling and surveying was performed in protection level D.

Seven boreholes were advanced and completed in the lagoon. These included two borings at the northeastern spill site, two borings at the northern spill site, and three borings at the northwestern spill site. The background boring was located approximately 600 ft west of the lagoon just north of the site access road. The boring locations, approximate spill areas, and site dimensions are shown in Figure 3-11.

Borings placed in the spill areas were drilled from the location expected to have the least amount of contamination (north spill) to the location expected to have the most contamination (northwest spill). Samples in each of the borings were collected at the surface, at the first interval at which visible contamination was not observed, and at the first interval in which background air monitoring levels were obtained. The boreholes were completed at the depth at which the last sample was obtained. The sampling intervals and borehole completion depths are significantly different between spill sites and are discussed separately. Boring logs for SWMU #39 are included as Appendix C to this report.

3.8.1 BACKGROUND BORING

The background boring was drilled and completed to 15 ft. A surface sample was collected from 0 to 0.5 ft and four split spoon samples were collected from the following depths: 1 to 3 ft, 3 to 5 ft, 8 to 10 ft, and 13 to 15 ft. OVA screenings of the sample headspace did not encounter readings above

background levels. Subsurface soils consisted primarily of brown silty sands to 7 ft and well graded sands below this depth.

3.8.2 NORTH SPILL SITE

Boring B-1 was drilled, sampled continuously with a split spoon and completed to 12.5 ft. A surface sample was collected from 0 to 0.5 ft and two split spoon samples were retained from 2.5 to 4.5 ft and 10.5 to 12.5 ft. OVA readings attained a level of 10 ppm above background between 0.5 and 2.5 ft and decreased to near background levels below this depth. Soils were comprised primarily of brown silty sands which exhibited staining to a depth of 2.5 ft.

Boring B-2 was drilled and completed to a depth of 18.5 ft. A surface sample was collected from 0 to 0.5 ft and two split spoon samples were retained from 12.5 to 14.5 ft and 16.5 to 18.5 ft. OVA readings increased with depth below the surface to 120 ppm above background at 6.5 ft. Readings decreased below this depth to background levels at 18.5 ft. Soils were comprised primarily of brown silty sands which exhibited staining to a depth of 12.5 ft.

3.8.3 NORTHEAST SPILL SITE

Borings B-3 and B-4 were drilled, sampled continuously with a split spoon to 6.5 ft and completed to a depth of 12 ft. Samples were collected in each borehole from 0 to 0.5 ft, 4.5 to 6.5 ft and 10 to 12 ft. OVA readings obtained from B-3 decreased from 12 ppm at the surface to background levels at 2.5 ft. OVA readings from B-4 were between 0.2 to 1 ppm above background levels to a depth of 6.5 ft. Below this depth background levels were obtained. Soils primarily consisted of brown silty sands. Sandy clays were encountered in borehole B-3 between 6.5 and 8 ft. Soils were stained to a depth of 6 in and 2 ft in borings B-3 and B-4, respectively.

3.8.4 NORTHWEST SPILL SITE

Boring B-5 was drilled, sampled continuously with a split spoon and completed to a depth of 16.5 ft. A surface sample was collected from 0 to 0.5 ft and two split spoon samples were retained from 6.5 to 8.5 ft and 14.5 to 16.5 ft. OVA readings increased with depth below the surface to 44 ppm above background at 8.5 ft. Readings decreased below this depth to background levels at 16.5 ft. Soils were comprised primarily of brown silty sands to 4.5 ft, well graded sands to 13.5 ft, and red brown silty clays to 16.5 ft. The soils exhibited staining to a depth of 6.5 ft.

Boring B-6 was drilled, sampled continuously with a split spoon, and completed to a depth of 20.5 ft. A surface sample was collected from 0 to 0.5 ft and two split spoon samples were retained from 10.5 to 12.5 ft and 18.5 to 20.5 ft. OVA readings increased with depth below the surface to 140 ppm above background levels at 8.5 ft. Readings decreased below this depth to background levels at 19 ft. Soils were comprised primarily of brown silty sands to 3 ft, well graded sands to 9 ft, red clays to 14.5 ft, and brown silty sands to 20.5 ft. The soils exhibited staining to a depth of 9.5 ft.

Boring B-7 was drilled and completed to a depth of 18.5 ft. A surface sample was collected from 0 to 0.5 ft and two split spoon samples were retained from 8.5 to 10.5 ft and 16.5 to 18.5 ft. OVA readings increased with depth below the surface to 92 ppm above background levels at 6.5 ft. Readings decreased below this depth to background levels at 16.5 ft. Soils were comprised primarily of brown silty sands to 2.5 ft, well graded sands to 7 ft, red clays to 10.5 ft, and brown silty sands to 18.5 ft. The soils exhibited staining to a depth of 7.0 ft.

3.8.5 SURFACE SAMPLE, SPILL SITE

Surface sample B-8, a mound of discolored soil, was collected from a depth of 0 to 0.5 ft with a stainless steel scoop. OVA readings of the sample were not

above background levels; however, the soil appeared to be stained brown. The sample consisted of silty sands.

3.9 SWMU #45, STORMWATER IMPOUNDMENT AREA

The stormwater impoundment area, SWMU #45, is located north of Fred Wilson Road and north of the main cantonment area. The general location of the site within the Fort Bliss complex is shown in Figure 3-4. Stormwater runoff collects in this impoundment during major precipitation events. The lowest portion of the impoundment is located in the southwest corner. During a site visit in September 1989, the vast majority of the impoundment was dry and covered with vegetation; however, vegetation was devoid in the southwestern corner.

The objective of the activities performed at SWMU #45 was to delineate possible subsurface contamination in the area devoid of vegetation.

Four boreholes were advanced and completed in the impoundment. The boring locations are shown in Figure 3-12. Three samples were collected in each of the borings at 0 to 0.5 ft, at a depth which yielded the highest organic vapor reading, and at the first interval at which organic vapors were nondetectible. The borings did not exceed a total depth of 20 ft.

All sampling and surveying was performed in protection level D. Air monitoring was performed continuously with an OVA, and organic vapors above background levels were not detected. Air monitoring forms for SWMU #45 are included in Appendix D to this report.

Boring B-1 was drilled and completed to a depth of 11.5 ft. A surface sample was collected from 0 to 0.5 ft. Since organic vapors were not found above background levels, the proceeding two split-spoon samples were retained from

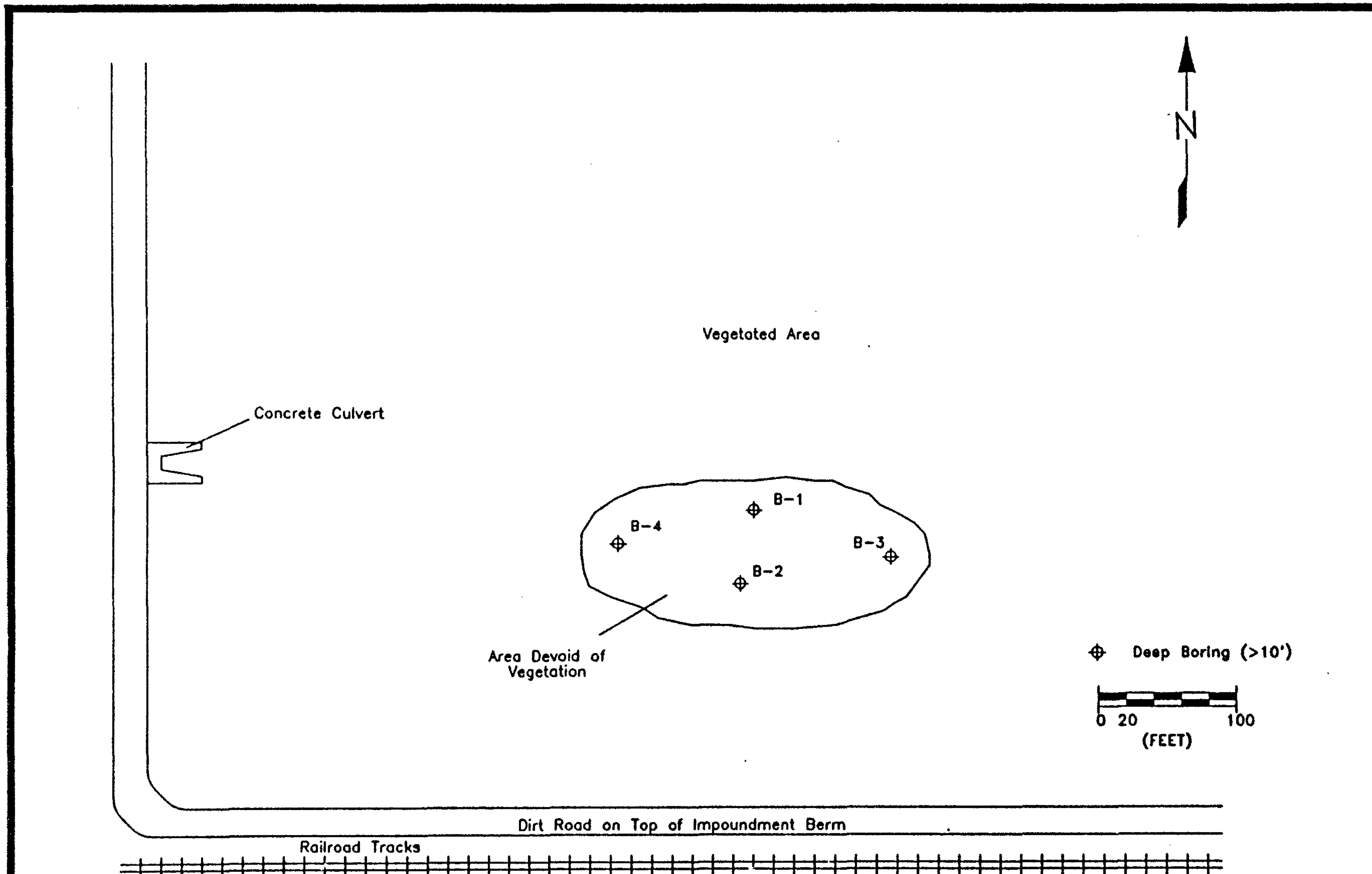

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Figure 3-12
STORMWATER IMPOUNDMENT AREA – SWMU 45

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Checked by:	File: bliss45

4.5 to 6.5 ft and 10 to 11.5 ft. Soils consisted primarily of brown silty sands alternating with thin to thick beds of silty clays.

Borings B-2, B-3, and B-4 were drilled and completed to a depth of 20 ft. Water was encountered in these wells at 17.5 ft, 17.5 ft and 18.5 ft, respectively. A surface sample was collected from 0 to 0.5 ft in each of the three boreholes. Since organic vapors were not encountered with depth, the second sample was collected at approximately 5 ft in each of the borings. The third sample in boring B-2 was collected from within the water interval at 18.5 to 20 ft. The remaining samples from Borings B-3 and B-4 were collected at 10 to 11.5 ft. Soils consisted primarily of silty clays to a depth of 5.5 ft in B-3 and 10 ft in B-2 and B-4. Well graded sands were encountered in all borings below these depths. A well-developed caliche layer was encountered in boring B-3 between 13 and 14 ft. Boring logs for SWMU #45 are included in Appendix C to the report.

3.10 SWMU #50, PESTICIDE STORAGE AND MIXING AREA, BUILDINGS. NO. 60-36 AND 60-276

SWMU #50 consists of a fenced yard and buildings no. 60-36 and 60-276 used for pesticide storage and mixing. The general location of the site within the Fort Bliss complex is shown in Figure 3-4. A survey conducted in 1983 by USAEHA revealed an ongoing spill problem in this area. Surface soil samples collected at that time contained detectible concentrations of chlordane, diazinon, malathion and DDT.

The objective of the activities performed at SWMU #50 was to collect surface and subsurface samples to assess the presence and/or migration of compounds which may have leaked or may have been spilled. Air monitoring was performed continuously with an OVA, and organic vapors were not encountered above background levels. All activities were performed in protection level C due to the possibility of contaminant and dust inhalation during drilling and sampling

procedures. Surface and subsurface sampling were performed in accordance with the work plan and are detailed below. The boring and surface sampling locations and site dimensions for SWMU #50 are shown in Figure 3-13.

3.10.1 SURFACE SAMPLING

At total of six surface soil samples were collected from locations within the pesticide storage and mixing area. Samples were collected with a stainless steel scoop from a depth of 0 to 6 in. Samples consisted primarily of moist, brown stained, silty-sandy clay.

3.10.2 BOREHOLE SAMPLING

Borings B-1, B-2, and B-3 were drilled and completed to a depth of 10 ft. Samples were retained from 1 to 3 ft, 3 to 5 ft, and 8 to 10 ft. Soils consisted of sand and gravel fill to 1 ft, reddish-brown soft clayey sands to 7 ft, and reddish-brown well graded sands to 10 ft. Boring logs for SWMU #50 can be found in Appendix C to this report.

3.11 SWMU #63, HERBICIDE STORAGE, BUILDING NO. 11160

The general location of SWMU #63, the herbicide storage building, within the Fort Bliss complex is shown in Figure 3-4. During a site visit in July 1989, building no. 11160 was being used for the storage of more than 25 different herbicides, including a considerable amount of 2,4-D. The interior wooden floor appeared to be deteriorating and there was evidence of spilled herbicides inside the building. These spills have reportedly resulted in contamination of interior construction materials and soils beneath the buildings. Spills outside of the buildings in the vicinity of the loading docks are also probable.

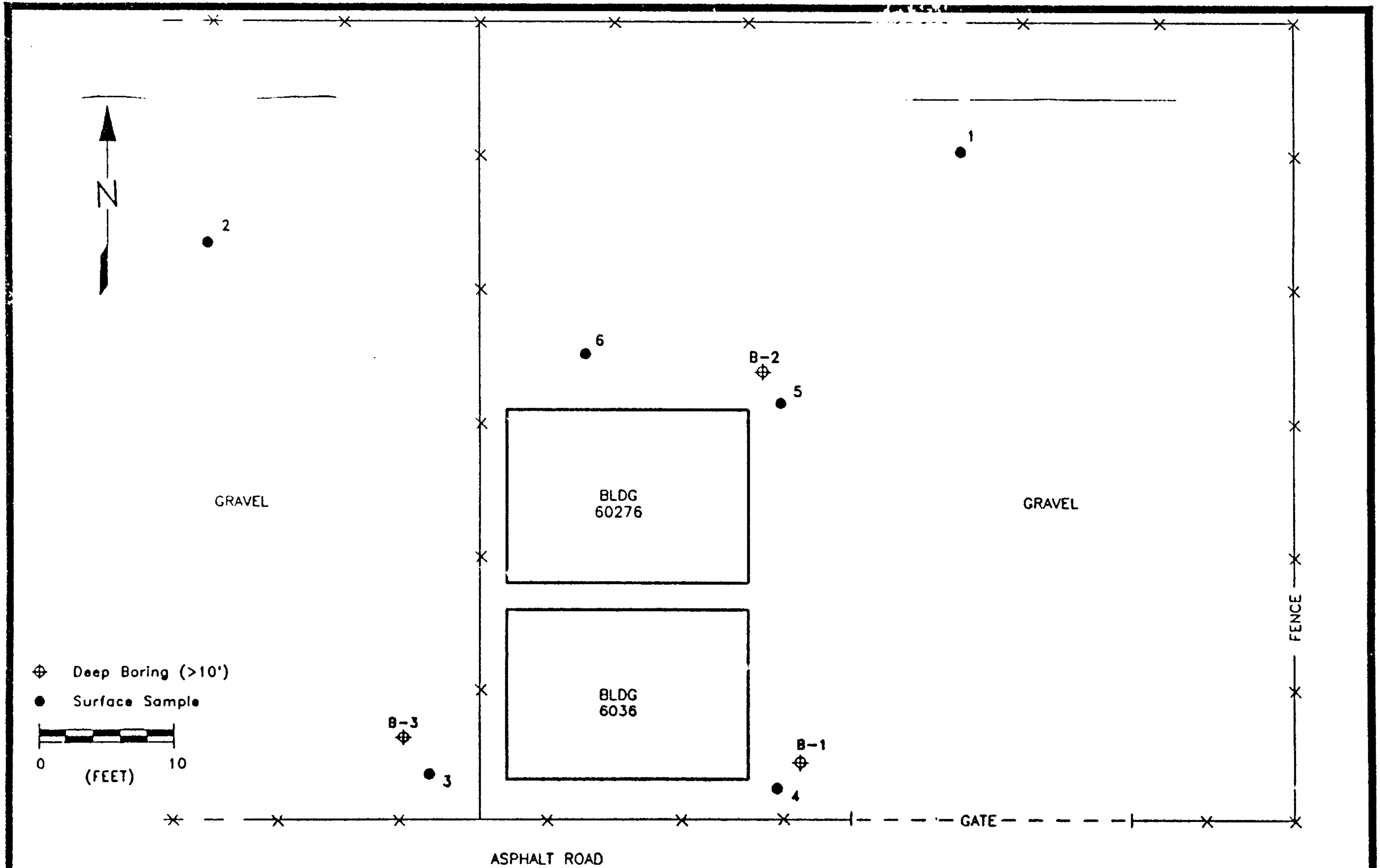

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Figure 3-13
PESTICIDE STORAGE AND MIXING AREA,
BUILDINGS NO. 6036 AND 60276 – SWMU 50

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Checked by:	File: bliss4

The objective of the activities performed at SWMU #63 included surface soil sampling, wipe sampling, and wood/construction material sampling to assess the presence and/or migration of compounds which may have leaked or may have been spilled.

Air monitoring was performed continuously with an OVA, and organic vapors were not encountered above background levels. All activities were performed in protection level C due to the possibility of contaminant and dust inhalation during sampling procedures. Sampling activities were performed in accordance with the work plan and are detailed below. The locations of sample collection points for SWMU #63 are described on the Soil/Sediment Sampling Forms located in Appendix B of this report. Air monitoring sheets are included in Appendix D.

3.11.1 SURFACE SAMPLING

Surface soil samples S0-1 through SO-4 were collected from stained areas in the crawl space beneath building no. 11160. The samples were obtained with a stainless steel scoop from a depth of 0 to 6 in and consisted primarily of dry, stained, poorly graded brown sands. An overlying surface crust was present at all locations to a depth of 0.5 in. Debris consisting of construction nails, glass, suspect asbestos siding and other materials were also present beneath the buildings.

Two additional surface soil samples were collected from stained areas in the crawl spaces located beneath the loading docks. Sample SO-5 was collected beneath the north loading dock and SO-6 was collected beneath the south loading dock. The samples were collected with a stainless steel scoop from a depth of 0 to 6 in and consisted of dry, stained, poorly graded brown sands. An overlying surface crust was present at all locations to a depth of 0.5 in.

3.11.2 WIPE SAMPLING

Five wipe samples were collected from construction materials inside the herbicide storage building. The samples were obtained with a glass fiber filter, presoaked with methylene chloride. Sample WP-1 was collected from the north wall near the west corner of the building, samples WP-2, WP-3, and WP-4 were collected from the floor of the herbicide storage room, and WP-5 was collected from the south wall, east of the access door.

3.11.3 WOOD SAMPLING

Four wood samples were obtained within the herbicide storage room. The samples were collected with a cordless electric drill utilizing a 1 in diameter steel boring bit. Samples WD-1, WD-2, and WD-3 were collected at wipe sample stations 1, 2 and 3, respectively and WD-4 was collected at wipe sample station 5. Sample WP-1 consisted of paint and wood shavings, WP-2 and WP-3 consisted of tile and wood shavings, and WP-4 consisted of drywall paneling and wood shavings.

4.0 DATA EVALUATION

The following sections will discuss the analytical results obtained for the soil samples collected during the Fort Bliss RFI. The analytical data have been compared to U.S. Environmental Protection Agency (EPA) actions levels proposed under Subpart S of the Resource Conservation and Recovery Act (Federal Register July 27, 1990). Actions levels are concentrations of various parameters in soil, water, or air above which a corrective measure study for the facility could be triggered. Action levels are health- and environmental-based levels determined by EPA to be indicators for protection of human health and the environment. Action levels have been set for hazardous constituents, a subset of hazardous wastes, which can also be complex mixtures of many constituents. Where appropriate, action levels are based on promulgated standards. In other cases, the action levels have been established by EPA on the basis of general criteria. The numerical values used for comparison in this section were obtained from two sources: a) Appendix F of the new Subpart S of RCRA, proposed by EPA July 27, 1990, and b) Health Effects Assessment Summary Tables (HEAST) prepared by EPA's Office of Health and Environmental Assessment. Table 4-1 lists those parameters with action levels (if available) identified in the soil samples collected during the field investigation. Table 4-2 lists the same information for parameters in water samples. The analytical results from the samples collected at each SWMU will be discussed in the following subsections in the same order as they appeared in Section 3.0.

4.1 SWMU #1, SANITARY LANDFILL NO. 1 (ACTIVE)

SWMU #1 was divided into two subunits, the large and small grease pits. These two units will be discussed separately in the following two sections.

TABLE 4-1
ACTION LEVELS - SOILS

PARAMETER	ACTION LEVEL	PARAMETER	ACTION LEVEL
ACENAPHTHENE	4800 MG/KG	PCB-1232	0.09 MG/KG
ACETONE	8000 MG/KG	PCB-1254	0.09 MG/KG
ANTHRACENE	24000 MG/KG	PCB-1260	0.09 MG/KG
BENZO(A)ANTHRACENE	Data Inadequate	ALDRIN	0.04 MG/KG
BIS(2-ETHYLHEXYL)PHTHALATE	50 MG/KG	BHC,A	0.111 MG/KG
CHRYSENE	Data Inadequate	BHC,B	3.89 MG/KG
DIBENZOFURAN	Data Inadequate	BHC,G (LINDANE)	0.5 MG/KG
TRANS-1,2-DICHLOROETHENE	1600 MG/KG	CHLORDANE	0.5 MG/KG
DIETHYLPHTHALATE	60000 MG/KG	CHLOROPYRIFOS	240 MG/KG
ETHYLBENZENE	8000 MG/KG	DDD,PP'	3 MG/KG
FLUORANTHENE	3200 MG/KG	DDE,PP'	2 MG/KG
FLUORENE	3200 MG/KG	DDT,PP'	2 MG/KG
2-MET'NAP'LENE	No information available	DIAZINON	72 MG/KG
4-METHYLPHENOL	No information available	DIELDRIN	0.04 MG/KG
NAPHTHALENE	320 MG/KG	ENDRIN	20 MG/KG
PHENANTHRENE	Data Inadequate	ENDOSULFAN SULFATE	4 MG/KG
PYRENE	2400 MG/KG	ETY'PARATHION	No information available
TETRACHLOROETHENE	800 MG/KG	FENSULFOTHION	No information available
TOLUENE	20000 MG/KG	HEPTACHLOR	0.2 MG/KG
TRICHLOROETHENE	63.6 MG/KG	HEPTACHLOR EPOXIDE	0.08 MG/KG
XYLENE	200000 MG/KG	MALATHION	1600 MG/KG
		PHORATE	No information available

TABLE 4-1 (Page 2 of 2)
ACTION LEVELS - SOILS

PARAMETER	ACTION LEVEL	EP TOXICITY LEVEL	TCLP LEVEL
TRICHLORONATE	No information available		
2,4-D	No information available		
2,4,5-TP/SILVEX	24 MG/KG		
2,4,5-T	800 MG/KG		
ARSENIC	80 MG/KG	5.0 MG/L	5.0 MG/L
BARIUM	4000 MG/KG	100 MG/L	100 MG/L
CADMIUM	40 MG/KG	1.0 MG/L	1.0 MG/L
CHROMIUM (III)	80000 MG/KG	5.0 MG/L	5.0 MG/L
LEAD	Not Determined	5.0 MG/L	5.0 MG/L
MERCURY	20 MG/KG	0.2 MG/L	0.2 MG/L
SELENIUM	240 MG/KG	1.0 MG/L	1.0 MG/L
SILVER	200 MG/KG	5.0 MG/L	5.0 MG/L
DIOXIN			
TOTAL TCDD			
(13C-2,3,7,8-TCDD)	4.6 x 10-6 MG/KG		
FURAN			
TOTAL TCDF			
(13C-2,3,7,8-TCDF)	Data Inadequate		

TABLE 4-2
ACTION LEVELS - WATER

PARAMETER	ACTION LEVEL
ACETONE	4 MG/L
BENZOIC ACID	Data Inadequate
DI-N-BUTYL-PHTHALATE	4 MG/L
DIETHYLPHTHALATE	Data Inadequate
4-METHYL PHENOL	Data Inadequate
DDD,PP'	0.0001 MG/L
DDE,PP'	0.0001 MG/L
2,4-D	0.01 MG/L
BARIUM	1 MG/L
CADMIUM	0.01 MG/L
CHROMIUM (III)	Not available
LEAD	0.05 MG/L

4.1.1 SWMU #1 - LARGE GREASE PIT

Ten soil samples and one duplicate were collected from five borings completed at the large grease pit at this SWMU (Figure 3-5). All of the samples were analyzed for petroleum hydrocarbons, total metals, volatile organics, base neutral/acid extractable organics, and PCBs. Table 4-3 lists those parameters found above minimum detection levels. The majority of constituents were detected in sample S1A-B4-B, which was collected at location AB-4 at the 19-20.5 ft interval. This boring was located on the northern end of the presumed grease pit. One organic compound was also detected in this same boring at a depth of 14-15.5 ft. Five organic compounds were also identified in the sample collected from the 9-10.5 ft interval from boring AB-2. This boring is located just south of boring AB-4. No organics were detected in the sample collected at further depth from boring AB-2. At least four metals were identified in samples collected from each of the boreholes. Comparing the analytical results to available action levels reveals that no parameters were detected above recommended limits.

4.1.2 SWMU #1 - SMALL GREASE PIT

As previously discussed in Section 3.0, after several unsuccessful attempts, the location of the small grease pit could not be identified. Two boreholes were completed in the area believed to be the small grease pit. After discussions with Fort Bliss and Corps of Engineers personnel, it was decided to drill the remaining borings along the perimeter of the landfill in an attempt to identify the presence of any leachate. Four boreholes were completed on the east, south and west boundaries of the landfill. All of the borehole locations are identified in Figure 3-5. Two soil samples were collected from each of the six boreholes. All of the samples were analyzed for petroleum hydrocarbons, total metals, volatile organic compounds, base neutral/acid extractable compounds and PCBs. The analytical results are presented in Table 4-4. None of the samples contained organic compounds with the exception of petroleum hydrocarbons which were detected

TABLE 4-3
FORT BLISS RFI
SWMU #1 - SANITARY LANDFILL NO. 1 (ACTIVE)
LARGE GREASE PIT

SAMPLE ID			S1A-B1-A	S1A-B1-B	S1A-B2-A	S1A-B2-B	S1A-B3-A	S1A-B3-B	S1A-B-DP	S1A-B4-A	S1A-B4-B	S1A-B5-A	S1A-B5-B
DEPTH			17-18.5 FT	22-23.5 FT	9-10.5 FT	17-18.5 FT	17-18.5 FT	22-23.5 FT	22-23.5 FT	14-15.5 FT	19-20.5 FT	22-23.5 FT	27-28.5 FT
PARAMETER	UNITS	DETECTION LIMIT											
DATE			05/22/90	05/22/90	05/23/90	05/23/90	05/23/90	05/23/90	05/23/90	05/23/90	05/23/90	05/24/90	05/24/90
ACENAPHTHENE	UG/KG-DRY	<70	<73	<71	<79	<81	<71	<71	<71	<76	75	<71	<71
ANTHRACENE	UG/KG-DRY	<70	<73	<71	<79	<81	<71	<71	<71	<76	110	<71	<71
BENZO(A) ANTHRACENE	UG/KG-DRY	<70	<73	<71	90	<81	<71	<71	<71	<76	130	<71	<71
BIS(2-ETHYLHEXYL) PHTHALATE	UG/KG-DRY	<140	<150	<140	<160	<160	<140	<140	<140	630	<140	<140	<140
CHRYSENE	UG/KG-DRY	<70	<73	<71	92	<81	<71	<71	<71	<76	140	<71	<71
FLUORANTHENE	UG/KG-DRY	<70	<73	<71	140	<81	<71	<71	<71	<76	260	<71	<71
FLUORENE	UG/KG-DRY	<70	<73	<71	<79	<81	<71	<71	<71	<76	85	<71	<71
NAPHTHALENE	UG/KG-DRY	<70	<73	<71	<79	<81	<71	<71	<71	<76	170	<71	<71
PHENANTHRENE	UG/KG-DRY	<70	<73	<71	160	<81	<71	<71	<71	<76	420	<71	<71
PYRENE	UG/KG-DRY	<70	<73	<71	130	<81	<71	<71	<71	<76	270	<71	<71
PETROLEUM HYDROCARBONS	UG/G-DRY	<26	<28.8	43.6	<31.1	<31.9	<27.9	<27.5	<27.6	36.3	<27.7	<27.8	<27.7
ARSENIC	MG/KG-DRY	<0.023	2.79	0.727	2.49	2.65	2.04	1.65	1.35	3.63	1.32	1.22	0.729
BARIUM	MG/KG-DRY	<0.031	75.9	46.5	101	142	38.0	97.3	96.3	148	44.6	58.6	40.7
CADMIUM	MG/KG-DRY	<0.193	0.90	0.422	1.03	1.37	0.757	0.625	<0.25	0.748	0.394	<0.241	<0.234
CHROMIUM	MG/KG-DRY	<0.329	4.10	15.2	4.29	6.12	3.61	4.03	2.89	4.39	4.09	4.16	1.57
LEAD	MG/KG	<0.14	4.84	2.48	5.81	4.72	4.45	3.28	3.19	4.00	3.00	3.16	3.01

Note:
All samples analyzed for petroleum hydrocarbons, metals, VOCs, BNAs, and PCBs.
Table lists only those parameters found above minimum detection limits.

TABLE 4-4
FORT BLISS RFI
SWMU #1 - SANITARY LANDFILL NO. 1 (ACTIVE)
SMALL GREASE PIT

SAMPLE ID			S1B-B1-A	S1B-B1-B	S1B-B2-A	S1B-B2-B	S1B-B-DP	S1B-B3-A	S1B-B3-B	S1B-B4-A	S1B-B4-B
DEPTH			15-16.5 FT	20-21.5 FT	7-8.5 FT	12-13.5 FT	12-13.5 FT	13-14.5 FT	18.5-20 FT	11.5-13 FT	16.5-18 FT
PARAMETER	UNITS	DETECTION LIMIT									
DATE			05/24/90	05/24/90	06/15/90	06/15/90	06/15/90	06/15/90	06/15/90	06/15/90	06/15/90
PETROLEUM HYDROCARBONS	UG/G-DRY	<26	<27.2	<27.5	<29.2	<26.8	<26.9	28	<28.5	<27.3	<26.2
ARSENIC	MG/KG-DRY	<0.023	0.693	0.899	2.66	0.987	1.39	1.09	1.28	2.71	1.06
BARIUM	MG/KG-DRY	<0.031	29.4	62.4	168	47.4	35.8	47.5	38.9	86.5	62.6
CADMIUM	MG/KG-DRY	<0.193	<0.25	<0.248	<0.258	<0.209	<0.244	<0.226	<0.222	<0.252	<0.212
CHROMIUM	MG/KG-DRY	<0.329	0.599	5.08	1.86	2.15	1.82	2.21	3.09	2.81	4.31
LEAD	MG/KG	<0.14	2.83	3.33	6.35	3.26	3.70	11.3	5.40	7.25	3.85
MERCURY	MG/KG-DRY	<0.062	<0.081	<0.077	<0.096	<0.067	<0.085	<0.075	<0.076	0.273	0.171

SAMPLE ID			S1B-B5-A	S1B-B5-B	S1B-B6-A	S1B-B6-B
DEPTH			10-11.5 FT	15-16.5 FT	10-11.5 FT	15-16.5 FT
PARAMETER	UNITS	DETECTION LIMIT				
DATE			06/16/90	06/16/90	06/16/90	06/16/90
PETROLEUM HYDROCARBONS	UG/G-DRY	<26	<27.6	<26.1	29.3	<29
ARSENIC	MG/KG-DRY	<0.023	4.41	2.50	1.60	4.08
BARIUM	MG/KG-DRY	<0.031	152	30.4	79.1	20.3
CADMIUM	MG/KG-DRY	<0.193	<0.251	<0.233	<0.257	<0.269
CHROMIUM	MG/KG-DRY	<0.329	5.17	3.21	3.16	5.31
LEAD	MG/KG	<0.14	5.86	4.53	4.01	6.88
MERCURY	MG/KG-DRY	<0.062	<0.101	0.952	<0.094	<0.075

Note:
All samples analyzed for petroleum hydrocarbons, metals, VOCs, BNAs, and PCBs.
Table lists only those parameters found above minimum detection limits.

in samples S1B-B3-A (borehole BB-3) and S1B-B6-A (borehole BB-6). The concentrations in these two samples were just above the minimum detection limit. All of the samples contained at least four metals (arsenic, barium, chromium and lead). Mercury was detected in samples from the two boreholes on the southern boundary of the landfill. None of the metals are above the recommended action levels.

4.2 SWMU #3, SANITARY LANDFILL NO. 2 (CLOSED)

SWMU #3 consists of 18 north-south trending fill cells which are approximately 50 ft in width and over 1000 ft in length (Figure 3-6). No environmental samples were collected at this SWMU. Five shallow excavations were dug for the purpose of assessing whether or not hazardous wastes might have been disposed of in this landfill. None of the excavations contained visible signs of soil staining and there were no readings above background levels with the organic vapor detector. Appendix G is a photo-documentation log of the trenching activities. All of the trenches were dry and no leachate was observed in any of the holes.

4.3 SWMU #4, OIL PITS AT SANITARY LANDFILL NO. 2 (CLOSED)

This SWMU was divided into two subunits for sampling purposes during the field investigation. For ease in discussing the analytical results of the soil samples collected at this SWMU, the subunits will be discussed separately.

4.3.1 LARGE OIL PIT

Four borings were drilled at the four corners of the large oil pit (Figure 3-7). Two soil samples were collected from each of the four boreholes. The samples were sent to the laboratory and analyzed for total recoverable petroleum hydrocarbons, total metals, volatile organic compounds, base-neutral/acid extractable compounds, and PCBs. The analytical results are presented on Table 4-5. The only organic compound detected from the perimeter of the large oil pit was petroleum hydrocarbons. This compound was identified in samples from

TABLE 4-5
FORT BLISS RFI
SWMU #4 - OIL PITS AT SANITARY LANDFILL NO. 2 (CLOSED)
LARGE OIL PIT

SAMPLE ID			S4A-B1-A	S4A-B1-B	S4A-B2-A	S4A-B2-B	S4A-B-DP	S4A-B3-A	S4A-B3-B	S4A-B4-A	S4A-B4-B
DEPTH			11.5-13 FT	18.5-20 FT	13-14.5 FT	18.5-20 FT	18.5-20 FT	13-14.5 FT	18.5-20 FT	13-14.5 FT	18.5-20 FT
PARAMETER	UNITS	DETECTION LIMIT									
DATE			06/06/90	06/06/90	06/06/90	06/06/90	06/06/90	06/06/90	06/06/90	06/06/90	06/06/90
PETROLEUM HYDROCARBONS	UG/G-DRY	<26	<28.3	<27	28.6	<27.8	<26.2	30.8	<27.3	<27.7	<26.6
ARSENIC	MG/KG-DRY	<0.023	5.66	1.99	2.05	1.80	3.18	1.40	1.36	1.93	3.38
BARIUM	MG/KG-DRY	<0.031	29.3	23.8	52.9	94.8	81.2	54.4	45.8	96.7	105
CHROMIUM	MG/KG-DRY	<0.329	2.14	2.22	10.3	5.10	4.62	2.87	3.49	3.47	6.85
LEAD	MG/KG	<0.14	5.11	3.27	3.46	4.06	3.97	3.04	2.63	3.03	4.23
MERCURY	MG/KG-DRY	<0.062	C.113	<0.083	<0.100	0.084	<0.088	0.143	<0.098	<0.089	<0.086

Note:
All samples analyzed for petroleum hydrocarbons, metals, VOCs, BNAs, and PCBs.
Table lists only those parameters found above minimum detection limits.

boreholes AB-2 and AB-3, the southeast and northwest ' -rings, respectively. The concentration of petroleum was just above the minimum detection limit of 26 ppm. Arsenic, barium, chromium, and lead were detected in all of the soil samples collected from these four boreholes. In addition, mercury was identified in samples from boreholes AB-1, AB-2 and AB-3 at varying depths. None of the concentrations of the constituents in the samples collected from the large pit perimeter were above RCRA action level guidelines.

4.3.2 SMALL OIL PIT

At the time of sampling, the surface of the small pit consisted of a dry, sludge-like material. In accordance with the Work Plan, three soil borings were drilled in the interior of the small oil pit (Figure 3-7). Two soil samples were collected form each of the borings. These samples were analyzed for the same parameters as the samples from the large pit borings. Table 4-6 lists the parameters found above minimum detection levels.

Sixteen organic compounds plus petroleum hydrocarbons were detected in the soil samples collected from the three boreholes. The samples collected from the 2.5 ft interval in each borehole had more compounds identified than the samples collected from the surface interval (0-4 inches). Twelve of the 16 organic compounds detected were identified in the sample collected from the 2.5 ft interval from borehole BB-1 which is located on the east end of the pit. None of these 12 compounds were above recommended action levels.

Seven organics were detected in the sample collected from the 2.5 ft interval at borehole BB-3, which is the northernmost borehole. Two of the compounds, tetrachloroethene and trichloroethene were detected at concentrations above the recommended action levels, 800 mg/kg and 63.6 mg/kg, respectively (Table 4-1).

TABLE 4-6
FORT BLISS RFI
SWMU #4 - OIL PITS AT SANITARY LANDFILL NO. 2 (CLOSED)
SMALL OIL PIT

SAMPLE ID			S4B-B1-A	S4B-B1-B	S4B-B-DP	S4B-B2-A	S4B-B2-B	S4B-B3-A	S4B-B3-B
DEPTH			0-4 IN	2.5 FT	2.5 FT	0-4 IN	2.5 FT	0-4 IN	2.5 FT
PARAMETER	UNITS	DETECTION LIMIT							
DATE			06/11/90	06/11/90	06/11/90	06/11/90	06/11/90	06/11/90	06/11/90
ACETONE	UG/KG-DRY	<2100	<14000	<5000	<4900	<2100	<14000	6400	<31000
TRANS-1,2-DICHLOROETHENE	UG/KG-DRY	<120	4800	8400	7300	220	<800	15000	1100000
ETHYLBENZENE	UG/KG-DRY	<230	<1600	880	900	<230	<1500	<300	<3400
TETRACHLOROETHENE	UG/KG-DRY	<200	<1400	2700	2100	<200	<1300	380	1200000*
TOLUENE	UG/KG-DRY	<170	1200	1900	2100	<170	5800	280	8900
TRICHLOROETHENE	UG/KG-DRY	<120	1100	3900	3900	<120	<800	210	490000*
XYLENE	UG/KG-DRY	<250	3000	4000	5000	<260	2400	<330	17000
BENZO(A) ANTHRACENE	UG/KG-DRY	<70	<29000	22000	20000	<7100	<28000	<69000	<79000
CHRYSENE	UG/KG-DRY	<70	<29000	21000	21000	<7100	<28000	<69000	<79000
FLUORANTHENE	UG/KG-DRY	<70	<29000	54000	45000	<7100	<28000	<69000	<79000
2-MET'NAP'LENE	UG/KG-DRY	<70	<30000	50000	30000	<7000	70000	<70000	100000
4-METHYLPHENOL	UG/KG-DRY	<140	<57000	<42000	<32000	<14000	<56000	<140000	280000
NAPHTHALENE	UG/KG-DRY	<70	<29000	<21000	<16000	<7100	46000	<69000	<79000
PHENANTHRENE	UG/KG-DRY	<70	<29000	55000	45000	<7100	<28000	<69000	<79000
PYRENE	UG/KG-DRY	<70	<29000	37000	45000	<7100	<28000	<69000	<79000
PCB-1254	UG/KG-DRY	<20	<270	<240	<1200	16000*	3100*	<1300	<1500
PETROLEUM HYDROCARBONS	UG/G-DRY	<26	164000	96000	40700	7260	344000	203000	207000
ARSENIC	MG/KG-DRY	<0.023	33.2	13.8	4.14	38.2	8.31	44.4	20.4
BARIUM	MG/KG-DRY	<0.031	904	136	176	491	276	734	382
CADMIUM	MG/KG-DRY	<0.193	5.03	1.82	1.57	8.40	6.50	11.1	15.7
CHROMIUM	MG/KG-DRY	<0.329	26.8	10.0	8.97	57.4	40.8	42.5	62.3
LEAD	MG/KG	<0.14	15100	2570	975	18200	3050	34100	3760
MERCURY	MG/KG-DRY	<0.062	0.265	<0.112	0.193	0.618	0.104	0.132	0.803
SELENIUM	MG/KG-DRY	<0.132	0.293	0.230	<0.183	0.446	0.276	0.513	0.981
SILVER	MG/KG-DRY	<0.309	<0.529	<0.435	<0.415	7.92	3.29	10.2	1.05

Note:
All samples analyzed for petroleum hydrocarbons, metals, VOCs, BNAs, and PCBs.
Table lists only those parameters found above minimum detection limits.
* - Exceeds recommended action levels

PCB-1254 was detected in both soil samples collected from borehole BB-2, the southernmost borehole. The concentrations of PCB-1254 in both of these samples are above the action level of 0.09 mg/kg recommended for all PCBs.

Eight metals were identified in at least one of the soil samples collected from the boreholes drilled at this SWMU. None of the concentrations detected in any of the soil samples were above action levels.

4.3.3 OIL SAMPLES

Two oil samples plus a duplicate were collected from the large oil pit. These samples were analyzed for petroleum hydrocarbons, total metals, volatile organics, base neutral/acid extractable organics, and PCBs. The results are presented in Table 4-7. Both of the samples contained concentrations of PCB-1232 above the recommended action level of 0.09 mg/kg.

The Work Plan proposed collecting soil samples from below the oil layer. However, due to the thickness of the oil layer, the soil samples could not be collected. Thus the vertical extent of potential contamination has not been adequately defined. The oil layer should be removed before any further sampling is recommended.

4.4 SWMU #15, RUBBLE DUMP

The rubble dump site was originally thought to encompass the area east of the El Paso airport. During the May 1990 site visit, the Fort Bliss representative indicated that the rubble dump that was to be investigated was actually located adjacent to the NCO Academy Oxidation Lagoon (Figure 3-8). A reconnaissance of the area revealed many piles of construction debris including concrete blocks and shingles. Seven areas exhibiting ground staining were sampled as potential sources of contamination. At sample location seven (7) in the drainage culvert, two soil samples were collected, one at the 0-6 in interval

TABLE 4-7
FORT BLISS RFI
SWMU #4 - OIL PITS AT SANITARY LANDFILL NO. 2 (CLOSED)
LARGE OIL PIT - OIL HORIZON

SAMPLE ID			S4-OIL-2	S4-OIL-DP	S4-OIL-3
PARAMETER	UNITS	DETECTION LIMIT			
DATE			06/05/90	06/05/90	06/05/90
PCB-1232	UG/G-WET	<1.9	10*	16*	<1.9
BARIUM	MG/KG-WET	<0.075	155	130	192
CADMIUM	MG/KG-WET	<0.471	<0.471	<0.463	3.19
CHROMIUM	MG/KG-WET	<0.75	4.58	4.59	19.6
LEAD	MG/KG-WET	<4.33	739	729	3970
MERCURY	MG/KG-WET	<0.015	0.612	0.123	0.647

Note:
All samples analyzed for metals, VOCs, BNAs, and PCBs.
Table lists only those parameters found above minimum detection limits.
* - Exceeds recommended action levels

and the second at the 1-2 ft interval. All of the soil samples were analyzed for total petroleum hydrocarbons, volatile organics, base neutral/acid extractable organics and PCBs.

As the results in Table 4-8 indicate, only three organic compounds were detected in any of the samples; xylene, 2-methylnaphthalene, and phenanthrene. The concentrations at which these organic compounds were detected, were below recommended action levels.

The samples collected from the areas north of the lagoon contained more organic compounds than the samples collected from the drainage culvert east of the lagoon.

4.5 SWMU #30, HAZARDOUS WASTE AND PCB STORAGE FACILITY

SWMU #30 consists of the Fort Bliss hazardous waste facility, PCB storage facility and the adjacent yard. Three stained areas were noted within and just beyond the asphalt lot (Figure 3-9). A composite soil sample from the 0-3 ft depth interval was collected from these three areas. The samples were analyzed for PCBs. Table 4-9 presents the analytical results for the three soil samples and a duplicate. The results indicate that sample S30-SO-1 contained concentrations of PCB-1260 above the recommended action level of 90 ug/kg (note - the action level for this parameter is listed as 0.09 mg/kg on Table 4-1).

4.6 SWMU #31, OLD FIRE FIGHTING TRAINING AREA

Three trenches were excavated to a depth of 6 ft in SWMU #31 (Figure 3-10). Three soil samples were collected from each of the trenches and analyzed for petroleum hydrocarbons, total and TCLP metals, distilled water leachate metals, total and TCLP VOCs, total and TCLP BNAs and PCBs. The analytical results for these soil samples are presented in Tables 4-10 and 4-11.

TABLE 4-8
FORT BLISS RFI
SWMU #15 - RUBBLE DUMP SPILL SITE
RUBBLE PILES, GROUND STAINS, CULVERT

SAMPLE ID			S15-SO-1	S15-SO-2	S15-SO-3	S15-SO-4	S15-SO-5	S15-SO-6	S15-SO-DP	S15-SO-7	S15-SO-8
DEPTH			0-6 IN	0-6 IN	0-6 IN	0-6 IN	0-6 IN	0-6 IN	0-6 IN	0-6 IN	1-2 FT
PARAMETER	UNITS	DETECTION LIMIT									
DATE			05/10/90	05/11/90	05/11/90	05/11/90	05/11/90	05/11/90	05/11/90	05/11/90	05/11/90
XYLENE	UG/KG-DRY	<250	<260	1500	<510	1600	<510	<250	<250	<250	<260
2-MET'NAP'LENE	UG/KG-DRY	<70	<10000	10000	<7000	40000	20000	<400	<400	<400	<400
PHENANTHRENE	UG/KG-DRY	<70	<15000	<7300	8000	23000	<7200	<350	<350	<350	<370
PETROLEUM HYDROCARBONS	UG/G-DRY	<26	47700	12100	14100	30000	16600	30.9	94	58	<28.3
ARSENIC	MG/KG-DRY	<0.023	2.54	2.01	1.14	2.69	5.65	2.29	2.36	1.87	2.26
BARIUM	MG/KG-DRY	<0.031	129	67.4	38.4	97.1	148	47.8	47.7	54.2	142
CADMIUM	MG/KG-DRY	<0.193	1.01	0.76[illegible]	0.809	0.481	[illegible].37	0.501	0.830	0.654	0.822
CHROMIUM	MG/KG-DRY	<0.329	5.21	4.02	3.45	3.58	5.87	5.05	4.27	3.23	3.79
LEAD	MG/KG	<0.14	11.4	11.8	8.26	11.4	11.7	9.84	10.8	0.09	4.94
SILVER	MG/KG-DRY	<0.309	<0.909	<0.857	<0.890	1.13	<0.899	<0.881	<0.839	<0.778	<0.916

Note:
All samples analyzed for petroleum hydrocarbons, metals, VOCs, BNAs, and PCBs.
Table lists only those parameters found above minimum detection limits.

TABLE 4-9
FORT BLISS RFI
SWMU #30 - HAZARDOUS WASTE AND PCB STORAGE FACILITY
SURFACE SOILS

SAMPLE ID			S30-SO-1	S30-SO-DP	S30-SO-2	S30-SO-3
PARAMETER	UNITS	DETECTION LIMIT				
DATE			05/18/90	05/18/90	05/18/90	05/18/90
PCB-1260	UG/KG-DRY	<20	190*	200*	27	<22

Note:
All samples analyzed for PCBs.
Table lists only those parameters found above minimum detection limits.
* - Exceeds recommended action levels.

TABLE 4-10
FORT BLISS RFI
SWMU #31 - OLD FIRE FIGHTING TRAINING AREA
TRENCH SAMPLES

SAMPLE ID'S / PARAMETERS	UNITS	STORET / METHOD	S31-SO-1 FTBLS2 1	S31-SO-2 FTBLS2 2	S31-SO-3 FTBLS2 3	S31-SO-4 FTBLS2 4	S31-SO-5 FTBLS2 5	S31-SO-6 FTBLS2 6	S31-SO-7 FTBLS2 7	S31-SO-8 FTBLS2 8	S31-SO-9 FTBLS2 9	S31-SO-DP# FTBLS2 10
DATE / TIME			10/29/91 12:05	10/29/91 12:25	10/29/91 12:52	10/30/91 10:10	10/30/91 10:40	10/30/91 11:10	10/30/91 11:40	10/30/91 12:45	10/30/91 13:05	10/30/91 11:45
MOISTURE	%WET WT	70320 SI	5.7	12.1	19.3	9.9	12.4	13.4	5.4	12.1	6.7	5.0
BASE-NEUTRAL/ACID EXTRACTABLE		96389 S206										
POLYCHLORINATED BIPHENYLS		96389 S201										
PCB-1260	UG/KG-DRY	39508 SECS	124	--	--	--	--	--	--	--	--	--
VOLATILE ORGANIC COMPOUNDS		96389 S208										
TRPH (IR)	MG/KG-DRY	45501 SOXS	2100	680	1000	1400	--	25	3800	--	--	10000
RCRA TOXIC METALS		96389 S390A										
ARSENIC	MG/KG-DRY	1002 SMTLS	1.09	1.88	1.47	3.64	2.63	2.36	2.06	1.64	1.13	1.24
BARIUM	MG/KG-DRY	1007 SMTLS	250	227	215	78.8	148	119	91.1	159	29.4	87.7
CADMIUM	MG/KG-DRY	1027 SMTLS	3.74	--	--	--	--	--	--	--	--	0.33
CHROMIUM	MG/KG-DRY	1034 SMTLS	6.98	1.65	9.98	3.19	3.96	5.02	3.37	3.26	3.66	2.63
LEAD	MG/KG-DRY	1051 SMTLS	501	29.0	13.6	13.4	6.94	7.34	103	7.96	3.44	265
TCLP EXTRACT(METALS)		97160 SI										
TCLP METALS		96389 S502A										
ARSENIC	MG/L	1002 STCLP	0.42	0.001	--	--	0.003	0.002	0.001	0.01	0.01	0.002
BARIUM	MG/L	1007 STCLP	1.65	1.31	1.26	1.10	0.65	0.56	1.11	0.54	0.47	1.23
CADMIUM	MG/L	1027 STCLP	0.10	--	--	--	--	--	--	--	--	--
LEAD	MG/L	1051 STCLP	2.83	--	--	0.17	--	--	0.29	--	--	0.34
SILVER	MG/L	1077 STCLP	0.04	--	--	--	--	--	--	--	--	--
TCLP EXTRACT(VOA)		97160 SV										
TCLP VOLATILE ORGANIC COMPOUND		96389 S502B										
TCLP EXTRACT(BNA)		97160 SO										
TCLP BASE-NEUTRAL/ACID EXTRACT		96389 S502C										

TABLE 4-11
FORT BLISS RFI
SWMU #31 - OLD FIRE FIGHTING TRAINING AREA
TWC LEACHATES

SAMPLE ID'S / PARAMETERS	UNITS	STORET / METHOD	S31-SO-1-1 FTBLS2T 1	S31-SO-1-2 FTBLS2T 2	S31-SO-1-3 FTBLS2T 3	S31-SO-1-4 FTBLS2T 4	S31-SO-2-1 FTBLS2T 5	S31-SO-2-2 FTBLS2T 6	S31-SO-2-3 FTBLS2T 7	S31-SO-2-4 FTBLS2T 8	S31-SO-3-1 FTBLS2T 9	S31-SO-3-2 FTBLS2T 10	S31-SO-3-3 FTBLS2T 11	S31-SO-3-4 FTBLS2T 12	S31-SO-4-1 FTBLS2T 13	S31-SO-4-2 FTBLS2T 14	S31-SO-4-3 FTBLS2T 15
DATE			10/29/91	10/29/91	10/29/91	10/29/91	10/29/91	10/29/91	10/29/91	10/29/91	10/29/91	10/29/91	10/29/91	10/29/91	10/30/91	10/30/91	10/30/91
TIME			12:05	12:05	12:05	12:05	12:25	12:25	12:25	12:25	12:52	12:52	12:52	12:52	10:10	10:10	10:10
TWC EXTRACT		97160 ST															
RCRA TOXIC METALS		96389 S379A															
ARSENIC	MG/L	1002 SCLP	0.003	0.003	0.006	0.007	0.005	0.004	0.004	0.003	0.01	0.03	0.01	0.01	0.005	0.004	0.005
BARIUM	MG/L	1007 SCLP	0.09	0.09	0.08	0.07	0.16	0.16	0.14	0.14	0.09	0.08	0.09	0.09	0.03	0.03	0.02
LEAD	MG/L	1051 SCLP	0.02	0.03	0.02	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 4-11 (Page 2 of 3)
FORT BLISS RFI
SWMU #31 - OLD FIRE FIGHTING TRAINING AREA
TWC LEACHATES

MPLE ID'S		S31-SO-4-4	S31-SO-5-1	S31-SO-5-2	S31-SO-5-3	S31-SO-5-4	S31-SO-6-1	S31-SO-6-2	S31-SO-6-3	S31-SO-6-4	S31-SO-7-1	S31-SO-7-2	S31-SO-7-3	S31-SO-7-4	S31-SO-8-1	S31-SO-8-2
RAMETERS	STORET	FTBLS2T	FTBLS2T	FTBLS2T	FTBLS2T	FTBLS2T	FTBLS2T	FTBLS2T	FTBLS2T	FTBLS2T	FTBLS2T	FTBLS2T	FTBLS2T	FTBLS2T	FTBLS2T	FTBLS2T
UNITS	METHOD	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
TE		10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91
ME		10:10	10:40	10:40	10:40	10:40	11:10	11:10	11:10	11:10	11:40	11:40	11:40	11:40	12:45	12:45
C EXTRACT	97160															
	ST															
RA TOXIC METALS	96389															
	S379A															
SENIC	1002	0.003	0.01	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.007	0.007	0.006	0.006	0.006	0.006
MG/L	SCLP															
RIUM	1007	0.02	0.07	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.09	0.08	0.08	0.09	0.02	0.02
MG/L	SCLP															
DMIUM	1027	--	--	--	--	--	--	--	--	--	0.003	--	--	--	--	--
MG/L	SCLP															
ROMIUM	1034	--	0.008	--	--	--	0.003	--	--	--	--	--	0.01	--	--	--
MG/L	SCLP															

TABLE 4-11 (Page 3 of 3)
FORT BLISS RFI
SWMU #31 - OLD FIRE FIGHTING TRAINING AREA
TWC LEACHATES

SAMPLE ID'S PARAMETERS UNITS	STORET METHOD	S31-SO-8-3 FTBLS2T 31	S31-SO-8-4 FTBLS2T 32	S31-SO-9-1 FTBLS2T 33	S31-SO-9-2 FTBLS2T 34	S31-SO-9-3 FTBLS2T 35	S31-SO-9-4 FTBLS2T 36	S31-SODP-1 FTBLS2T 37	S31-SODP-2 FTBLS2T 38	S31-SODP-3 FTBLS2T 39	S31-SODP-4 FTBLS2T 40
DATE		10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91	10/30/91
TIME		12:45	12:45	13:05	13:05	13:05	13:05	11:45	11:45	11:45	11:45
TWC EXTRACT	97160 ST										
RCRA TOXIC METALS	96389 S379A										
ARSENIC MG/L	1002 SCLP	0.007	0.008	0.002	0.003	0.004	0.003	0.009	0.009	0.008	0.008
BARIUM MG/L	1007 SCLP	0.02	0.02	0.02	0.02	0.02	0.02	0.09	0.07	0.07	0.07
SELENIUM MG/L	1147 SCLP	--	--	0.003	0.002	0.003	0.003	--	--	--	--

PCB-1260 was detected in the soil sample marked S31-S0-1. The concentration of PCB-1260 in this sample was 0.124 mg/kg, above the recommended action level of 0.09 mg/kg.

Metals were detected in soil samples analyzed for TCLP metals, total metals, and TWC leachates for metals. The TCLP lead level detected in S31-S0-1 was 2.83 mg/l and the total lead level in this sample was 501 ppm. There is currently no recommended action level for lead proposed under Subpart S of RCRA. None of the samples contained organic compounds with the exception of petroleum hydrocarbons which were detected at levels up to 10,000 ppm.

4.7 SWMU #39, NCO ACADEMY OXIDATION LAGOON

Sewage generated at the NCO Academy is piped to this unlined, earthen lagoon for evaporation. However, during the time of the field investigation there was no standing water observed in the lagoon. Three areas of staining along the northern boundary of the lagoon had been observed during previous site visits. A fourth area was noted during the May/June field investigation. These four areas are identified in Figure 3-11. The sampling activities conducted at these four locations are discussed separately in the following sections.

4.7.1 NORTHERN SPILL

Two soil borings were completed in this spill area of the lagoon. The northernmost boring (S39-B1) was drilled to a total depth of 12.5 ft while the southernmost boring (S39-B2) was drilled to 18.5 ft. Three samples were collected from each boring based on the procedures outlined in the Work Plan. Each of the soil samples were analyzed for total petroleum hydrocarbons, total metals, volatile organics, base neutral/acid extractable organics, PCBs, pesticides and herbicides. Table 4-12 summarizes the analytical results. One volatile

TABLE 4-12
FORT BLISS RFI
SWMU #39 - NCO ACADEMY OXIDATION LAGOON
SOIL BORINGS - NORTHERN SPILLS

SAMPLE ID			S39-B1-A	S39-B1-B	S39-B1-C	S39-B2-A	S39-B2-B	S39-B2-C
DEPTH			0-6 IN	2.5-4.5 FT	10.5-12.5 FT	0-6 IN	12.5-14.5 FT	16.5-18.5 FT
PARAMETER	UNITS	DETECTION LIMIT						
DATE			06/11/90	06/11/90	06/11/90	06/12/90	06/12/90	06/12/90
XYLENE	UG/KG-DRY	<250	1200	<260	<260	<270	<260	<280
ACENAPHTHALENE	UG/KC-DRY	<70	<3600	<72	<73	<13000	150	<79
DIBENZOFURAN	UG/KG-DRY	<70	<3600	<72	<73	<13000	280	<79
FLUORENE	UG/KG-DRY	<70	<3600	<72	<73	<13000	310	<79
2-MET'NAP'LENE	UG/KG-DRY	<70	6000	<70	<70	<10000	2000	<80
NAPHTHALENE	UG/KG-DRY	<70	<3600	<72	<73	<13000	280	<79
PHENANTHRENE	UG/KG-DRY	<70	<3600	<72	<73	<13000	590	<79
ALDRIN	UG/KG-DRY	<0.501	18.8	<1.03	<1.04	7.01	<1.03	<1.13
DIELDRIN	UG/KG-DRY	<0.007	<1.02	<1.03	<1.04	0.012	0.012	0.013
2,4,5-TP/SILVEX	UG/KG-DRY	<5.11	<5.22	<5.25	<5.29	5.78	<5.23	<5.70
PETROLEUM HYDROCARBONS	UG/G-DRY	<26	4130	<28.4	<27.6	12300	307	<31
ARSENIC	MG/KG-DRY	<0.023	12.9	2.61	1.93	3.18	1.24	1.43
BARIUM	MG/KG-DRY	<0.031	48.6	51.3	31.7	93.4	37.2	42.2
CADMIUM	MG/KG-DRY	<0.193	<0.233	<0.235	<0.249	<0.267	<0.258	<0.279
CHROMIUM	MG/KG-DRY	<0.329	<0.373	2.80	2.69	4.61	1.25	7.30
LEAD	MG/KG	<0.14	15.5	6.81	5.78	168	4.62	11.1
MERCURY	MG/KG-DRY	<0.062	<0.084	<0.093	0.376	0.121	<0.082	0.103
SELENIUM	MG/KG-DRY	<0.132	<0.165	<0.183	<0.180	0.294	<0.165	<0.196

Note:
All samples analyzed for petroleum hydrocarbons, metals, VOCs, BNAs, PCBs, pesticides, and herbicides.
Table lists only those parameters found above minimum detection limits.

organic, six base neutral/acid extractable organics, two organochlorine pesticides and one chlorinated herbicide were identified in the samples. All parameters identified were below the recommended action levels listed on Table 4-1.

Seven metals were identified in the soil samples collected from the two borings within the northern spill. All metals concentrations were below action levels.

4.7.2 NORTHEAST SPILL

Two soil borings were drilled in the spill area located in the northeast corner of the lagoon. Both boreholes were drilled to a total depth of 12 ft. Three soil samples were collected from each borehole and analyzed for the same constituents as the samples from the northern spill. The analytical results of the six samples collected from the spill area are presented in Table 4-13. The surface soil sample collected from borehole S39-B3 (northernmost borehole) contained 10 organic compounds including aldrin, BHC,A and dieldrin. Samples from this same borehole collected at depth did not contain any of the same organics above detection limits except for dieldrin. All three samples from borehole S39-B4 also contained quantifiable amounts of dieldrin. In addition, the surface sample collected from borehole S39-B4 contained three other organic compounds.

TABLE 4-13
FORT BLISS RFI
SWMU #39 - NCO ACADEMY OXIDATION LAGOON
SOIL BORINGS - NORTHEAST SPILL

SAMPLE ID			S39-B3-A	S39-B3-B	S39-B3-C	S39-B4-A	S39-B4-B	S39-B4-C
DEPTH			0-6 IN	4.5-6.5 FT	10-12 FT	0-6 IN	4.5-6.5 FT	10-12 FT
PARAMETER	UNITS	DETECTION LIMIT						
DATE			06/12/90	06/12/90	06/12/90	06/12/90	06/12/90	06/12/90
XYLENE	UG/KG-DRY	<250	960	<270	<260	<250	<260	<260
ACENAPHTHALENE	UG/KG-DRY	<70	4800	<380	<72	<1800	<72	<72
DIBENZOFURAN	UG/KG-DRY	<70	6500	<380	<72	<1800	<72	<72
FLUORENE	UG/KG-DRY	<70	8100	<380	<72	<1800	<72	<72
2-MET'NAP'LENE	UG/KG-DRY	<70	40000	<400	<70	10000	<70	<70
NAPHTHALENE	UG/KG-DRY	<70	11000	<380	<72	1900	<72	<72
PHENANTHRENE	UG/KG-DRY	<70	21000	<380	<72	3100	<72	<72
ALDRIN	UG/KG-DRY	<0.501	48.5*	<1.08	<1.03	<1.01	<1.02	<1.03
BHC.A	UG/KG-DRY	<0.902	6.29	<1.19	<1.13	<1.11	<1.13	<1.13
DDE,PP'	UG/KG-DRY	<0.514	<1.02	<1.08	<1.03	6.59	<1.02	<1.03
DDT,PP'	UG/KG-DRY	<0.514	<1.02	<1.08	3.86	<1.01	<1.02	<1.03
DIELDRIN	UG/KG-DRY	<0.007	0.012	0.012	0.012	0.011	0.012	0.012
FENSULFOTHION	UG/KG-DRY	<50.1	<51.1	<54.1	<51.3	56.8	<51.2	<51.5
PETROLEUM HYDROCARBONS	UG/G-DRY	<26	46300	48.4	<28.2	19800	148	<28.3
ARSENIC	MG/KG-DRY	<0.023	2.63	9.60	2.52	1.97	2.76	1.76
BARIUM	MG/KG-DRY	<0.031	162	405	51.1	177	26.4	36.2
CADMIUM	MG/KG-DRY	<0.193	<0.254	<0.267	<0.253	0.247	<0.251	0.230
CHROMIUM	MG/KG-DRY	<0.329	2.01	6.92	2.32	1.53	1.83	2.70
LEAD	MG/KG	<0.14	8.64	10.6	10.4	5.88	10.1	5.50
MERCURY	MG/KG-DRY	<0.062	<0.070	<0.087	<0.099	<0.075	<0.091	0.890
SELENIUM	MG/KG-DRY	<0.132	<0.166	<0.170	<0.173	<0.171	<0.168	<0.169

Note:
All samples analyzed for petroleum hydrocarbons, metals, VOCs, BNAs, PCBs, pesticides, and herbicides.
Table lists only those parameters found above minimum detection limits.
* - Exceeds recommended action level.

The only organic compound identified above a recommended action level was aldrin in the sample labelled S39-B3-A. The concentration in this sample is 48.5 ug/kg; the recommended action level as listed on Table 4-1 is 40 ug/kg (equivalent to 0.04 mg/kg).

The surface soil sample collected from borehole S39-B4-A also contained five organic compounds. However, none of these compounds were detected above action levels.

Seven metals were identified in the six soil samples collected from the two boreholes drilled in the northeast spill area. None of the metals were detected above recommended action levels.

4.7.3 NORTHWEST SPILL

Three boreholes were drilled in the northwest spill area, the largest of the three spill areas in the lagoon. The boreholes were drilled to total depths of 16.5 ft (S39-B5), 20.5 ft (S39-B6) and 18.5 ft (S39-B7). Three soil samples were collected from each of the boreholes and analyzed for total petroleum hydrocarbons, total metals, volatile organics, base neutral/acid extractable organics, pesticides and herbicides. The analytical results for these soil samples are presented in Table 4-14. Fifteen organic compounds were identified in the samples from this spill area including five organochlorine pesticides and two chlorinated herbicides. The majority of compounds were identified in the soils collected from the northernmost borehole (S39-B5). None of the compounds identified were detected at concentrations above recommended action levels.

Arsenic, barium, cadmium, chromium and lead were detected in at least one sample from each borehole. All concentrations are below the action levels listed on Table 4-1.

TABLE 4-14
FORT BLISS RFI
SWMU #39 - NCO ACADEMY OXIDATION LAGOON
SOIL BORINGS - NORTHWEST SPILL

SAMPLE ID DEPTH PARAMETER	UNITS	DETECTION LIMIT	S39-B5-A 0-0.5 FT	S39-B5-B 6.5-8.5 FT	S39-B-DP 6.5-8.5 FT	S39-B5-C 14.5-16.5 FT	S39-B6-A 0-0.5 FT	S39-B6-B 10.5-12.5 FT	S39-B6-C 18.5-20.5 FT
DATE			06/14/90	06/14/90	06/14/90	06/14/90	06/14/90	06/14/90	06/14/90
XYLENE	UG/KG-DRY	<250	490	740	1700	<290	<260	<290	<250
ACENAPHTHALENE	UG/KG-DRY	<70	5800	960	<1800	<80	<7200	<81	<71
DIBENZOFURAN	UG/KG-DRY	<70	<3800	1600	<1800	<80	<7200	<81	<71
FLUORENE	UG/KG-DRY	<70	11000	1700	2100	<80	<7200	<81	<71
2-MET'NAP'LENE	UG/KG-DRY	<70	20000	20000	8000	<80	<7000	<80	<70
NAPHTHALENE	UG/KG-DRY	<70	<3800	3100	<1800	<80	<7200	<81	<71
PHENANTHRENE	UG/KG-DRY	<70	26000	6300	8700	<80	<7200	<81	<71
PYRENE	UG/KG-DRY	<70	8400	<710	<1800	<80	<7200	<81	<71
BHC,G (LINDANE)	UG/KG-DRY	<0.702	<1.09	<1.01	<1.02	<1.15	<1.04	<1.15	<1.02
DDE,PP'	UG/KG-DRY	<0.514	<1.09	<1.01	<1.02	<1.15	<1.04	<1.15	<1.02
CHLORDANE	UG/KG-DRY	<5.08	<10.9	< 0.1	<10.2	<11.5	<10.4	<11.5	21.7
DIELDRIN	UG/KG-DRY	<0.00/	0.012	0.011	0.012	0.013	0.012	0.013	0.012
ENDRIN	UG/KG-DRY	<0.501	<1.09	20.5	18.8	<1.15	5.41	<1.15	<1.02
2,4,5-TP/SILVEX	UG/KG-DRY	<5.11	<5.52	<5.11	<5.17	<5.79	<5.24	<5.81	<5.18
2,4,5-T	UG/KG-DRY	<5.37	<5.80	<5.38	<5.44	<6.09	<5.51	<6.11	<5.44
DIAZINON	UG/KG-DRY	<50.1	<54.3	<50.6	<50.8	<57.3	<51.8	<57.5	<50.8
PHORATE	UG/KG-DRY	<50.1	<54.3	<50.6	<50.8	<57.3	<51.8	<57.5	<50.8
TRICHLORONATE	UG/KG-DRY	<50.1	<54.3	<50.6	<50.8	<57.3	<51.8	<57.5	<50.8
PETROLEUM HYDROCARBONS	UG/G-DRY	<26	43900	5250	4790	85.1	23800	<31.6	75.5
ARSENIC	MG/KG-DRY	<0.023	2.70	1.37	1.96	7.63	1.56	8.01	0.775
BARIUM	MG/KG-DRY	<0.031	156	55.9	285	73.5	74.4	52.5	40.1
CADMIUM	MG/KG-DRY	<0.193	<0.262	<0.210	<0.201	0.296	0.737	0.317	<0.210
CHROMIUM	MG/KG-DRY	<0.329	1.55	2.54	1.66	10.9	0.400	10.1	3.89
LEAD	MG/KG	<0.14	6.41	5.51	3.79	10.8	10.4	14.2	3.75
MERCURY	MG/KG-DRY	<0.062	<0.105	<0.091	<0.062	<0.080	<0.069	<0.083	<0.94
SELENIUM	MG/KG-DRY	<0.132	<0.182	<0.147	<0.181	<0.154	<0.170	<0.173	<0.157

Note:
All samples analyzed for petroleum hydrocarbons, metals, VOCs, BNAs, PCBs, pesticides, and herbicides.
Table lists only those parameters found above minimum detection limits.

TABLE 4-14 (Page 2 Of 2)
FORT BLISS RFI
SWMU #39 - NCO ACADEMY OXIDATION LAGOON
SOIL BORINGS - NORTHWEST SPILL

SAMPLE ID			S39-B7-A	S39-B-DP	S39-B7-B	S39-B7-C	S39-B8-A	S39-B8-B
DEPTH			0-0.5 FT	0-0.5 FT	8.5-10.5 FT	16.5-18.5 FT	0-0.5 FT	1-3 FT
PARAMETER	UNITS	DETECTION LIMIT						
DATE			06/14/90	06/14/90	06/14/90	06/14/90	06/12/90	06/12/90
XYLENE	UG/KG-DRY	<250	<340	1700	<280	<260	<250	<260
ACENAPHTHALENE	UG/KG-DRY	<70	<9600	<7900	<79	<71	<700	<720
DIBENZOFURAN	UG/KG-DRY	<70	<9600	<7900	<79	<71	<700	<720
FLUORENE	UG/KG-DRY	<70	<9600	<7900	<79	<71	<700	<720
2-MET'NAP'LENE	UG/KG-DRY	<70	<10000	<8000	<80	<70	1000	<700
NAPHTHALENE	UG/KG-DRY	<70	<9600	<7900	<79	<71	<700	<720
PHENANTHRENE	UG/KG-DRY	<70	<9600	<7900	<79	<71	<700	<720
PYRENE	UG/KG-DRY	<70	<9600	<7900	<79	<71	<700	<720
BHC,G (LINDANE)	UG/KG-DRY	<0.702	<1.37	2.76	<1.13	<1.02	<1.01	<1.02
DDE,PP'	UG/KG-DRY	<0.514	<1.37	<1.13	<1.13	<1.02	<1.01	1.59
CHLORDANE	UG/KG-DRY	<5.08	<13.7	<11.3	<11.3	<10.2	<10.1	<10.2
DIELDRIN	UG/KG-DRY	<0.007	0.016	0.013	0.013	0.012	0.011	0.012
ENDRIN	UG/KG-DRY	<0.501	<1.37	<1.13	<1.13	<1.02	<1.01	<1.02
2,4,5-TP/SILVEX	UG/KG-DRY	<5.11	<6.94	112	<5.77	<5.17	<5.11	<5.20
2,4,5-T	UG/KG-DRY	<5.37	78.2	9.61	<6.06	<5.43	<5.37	<5.47
DIAZINON	UG/KG-DRY	<50.1	<68.7	<56.5	<56.7	<51.0	56	<51.2
PHORATE	UG/KG-DRY	<50.1	<68.7	<56.5	<56.7	<51.0	232	78.1
TRICHLORONATE	UG/KG-DRY	<50.1	<68.7	<56.5	<56.7	<51.0	70.5	<51.2
PETROLEUM HYDROCARBONS	UG/G-DRY	<26	40900	35800	<31.2	56.8	63700	18800
ARSENIC	MG/KG-DRY	<0.023	3.05	2.86	6.47	0.806	2.72	1.87
BARIUM	MG/KG-DRY	<0.031	155	85.9	31.1	35.2	65.2	83.4
CADMIUM	MG/KG-DRY	<0.193	0.587	0.508	<0.269	<0.243	0.351	0.342
CHROMIUM	MG/KG-DRY	<0.329	4.04	1.92	12.5	2.89	2.54	1.99
LEAD	MG/KG	<0.14	28.8	29.7	12.8	3.69	13.4	5.62
MERCURY	MG/KG-DRY	<0.062	<0.137	<0.091	<0.108	<0.081	<0.098	<0.077
SELENIUM	MG/KG-DRY	<0.132	<0.231	<0.180	<0.189	<0.161	<0.176	<0.180

Note:
All samples analyzed for petroleum hydrocarbons, metals, VOCs, BNAs, PCBs, pesticides, and herbicides.
Table lists only those parameters found above minimum detection limits.

4.7.4 "NEW SPILL"

Table 4-14 also presents the data from soil samples collected from S39-B8. This location was an addition to the Work Plan for the field investigation of the lagoon. This "new" spill was identified during the walking survey of the adjacent rubble dump. Samples were collected from the 0-6 in interval and the 1-3 ft interval. Both samples received the sample analyses as the rest of the soils from the lagoon. As Table 4-14 indicates, five organic compounds were identified in the surface soil sample collected from this location, three of which are classified as organophosphorus pesticides (diazinon, phorate and trichloronate). The concentration of diazinon, the only compound for which an action level is available, was below the recommended level of 72 mg/kg.

The concentrations of the five metals identified in the two soil samples were also below recommended action levels.

4.7.5 BACKGROUND BORING

The background boring, located approximately 600 ft to the west of the lagoon, was drilled and completed to 15 ft. Five soil samples were collected from the following depths: 0-6 in, 1-3 ft, 3-5 ft, 8-10 ft, and 13-15 ft. These five samples were analyzed for total metals only. The analytical results are present on Table 4-15. All of the concentrations listed for each of the four metals identified are below recommended action levels.

4.8 SWMU #45, STORMWATER IMPOUNDMENT AREA

The stormwater impoundment area is located north of the main cantonment area and collects stormwater runoff during major precipitation events at Fort Bliss. During the May/June 1990 field investigation, the lack of standing water in the lagoon prevented the collection of any surface water or sediment samples. Four sampling locations were chosen within the impoundment in an area lacking

TABLE 4-15

FORT BLISS RFI

SWMU #39 - NCO ACADEMY OXIDATION LAGOON

SOIL BORINGS - BACKGROUND SOIL BORING

SAMPLE ID			S39-BKG-A	S39-BKG-B	S39-BKG-C	S39-BKG-D	S39-BKG-E	S39-BKG-DP
DEPTH			0-1 FT	1-3 FT	3-5 FT	8-10 FT	13-15 FT	13-15 FT
PARAMETER	UNITS	DETECTION LIMIT						
DATE			06/11/90	06/11/90	06/11/90	06/11/90	06/11/90	06/11/90
ARSENIC	MG/KG-DRY	<0.023	1.91	2.14	1.93	1.07	0.584	0.443
BARIUM	MG/KG-DRY	<0.031	37.4	58.2	52.1	39.2	30.8	28.2
CHROMIUM	MG/KG-DRY	<0.329	3.25	3.76	3.75	2.21	2.14	2.59
LEAD	MG/KG	<0.14	10.7	5.81	5.05	2.63	2.63	3.37

Note:

All samples were analyzed for metals only.

Table lists only those parameters found above minimum detection limits.

vegetation. Figure 3-12 shows the approximate locations of the sampling points. Surface soil samples were collected for analyses from each of the four areas. In addition, two soil samples were collected at varying depths from boreholes completed at each location. The sampling depths were determined in the field according to observations made during the drilling operations. All of the samples were analyzed for total petroleum hydrocarbons, total metals, volatile organics, base neutral/acid extractable organics, pesticides, herbicides and PCBs. The analytical results as presented in Table 4-16 indicate that organochlorine pesticides were identified in the surface soils at each location. The surface soil sample collected from location S45-B2, the southernmost sample, had the highest concentrations of the pesticides. Comparing the concentrations detected with the action levels listed in Table 4-1, indicates that none of these pesticides exceeded any of the recommended levels. Likewise, the concentrations of the metals detected in the soil samples were below the action levels.

4.9 SWMU #50, PESTICIDE STORAGE AND MIXING AREA, BUILDINGS NO. 60-36 AND 60-276

SWMU #50 consists of a fenced yard containing two buildings and motor vehicles (Figure 3-13). Previous investigations of this SWMU revealed the presence of several pesticides. In accordance with the Work Plan, six surface soil samples and three soil borings were completed at this SWMU. Three subsurface soil samples were collected from each of the three borings. All of the soil samples were analyzed for pesticides and herbicides.

4.9.1 SURFACE SOILS

Six surface soil samples were collected both from within the fenced area and in the adjacent lot just to the west. The locations chosen represented areas of groundstaining as well as random locations. The analytical results are presented in Table 4-17. Both chlordane and DDT were detected at concentrations exceeding action levels. Chlordane was identified from samples collected

TABLE 4-16
FORT BLISS RFI
SWMU #45 - STORMWATER IMPOUNDMENT AREA
SOIL BORINGS

SAMPLE ID			S45-B1-A	S45-B1-B	S45-B1-C	S45-B2-A	S45-B2-B	S45-B2-C	S45-B3-A	S45-B3-B	S45-B3-C
DEPTH			0-0.5 FT	4.5-6.5 FT	10-11.5 FT	0-0.5 FT	5-6.5 FT	18.5-20 FT	0-0.5 FT	4-5.5 FT	10-11.5 FT
PARAMETER	UNITS	DETECTION LIMIT									
DATE			06/08/90	06/08/90	06/08/90	06/08/90	06/08/90	06/08/90	06/08/90	06/08/90	06/08/90
BIS(2-ETHYLHEXYL) PHTHALATE	UG/KG-DRY	<140	<3000	<160	150	860	<160	<160	<740	<150	<140
CHLORDANE	UG/KG-DRY	<5.08	49	<5.70	14.4	150	<5.66	<5.58	52	<5.43	<5.14
DDD,PP'	UG/KG-DRY	<0.501	7.00	<1.14	<1.04	11.6	<1.13	<1.12	5.56	<1.09	<1.03
DDE,PP'	UG/KG-DRY	<0.514	14.1	2.50	2.07	28.1	<1.13	<1.12	10.1	<1.09	<1.03
DDT,PP'	UG/KG-DRY	<0.514	7.06	<1.14	<1.04	12.4	<1.13	<1.12	7.11	2.11	<1.03
HEPTACHLOR	UG/KG-DRY	<0.501	2.11	<1.14	1.36	<1.06	<1.13	<1.12	1.61	<1.09	<1.03
PETROLEUM HYDROCARBONS	UG/G-DRY	<26	261	<31.4	<28.7	363	<30.3	<29.9	481	<30.1	348
ARSENIC	MG/KG-DRY	<0.023	4.22	4.61	1.52	5.65	3.07	1.32	0.159	0.054	0.026
BARIUM	MG/KG-DRY	<0.031	155	208	72.2	235	136	48.5	171	127	31.7
CADMIUM	MG/KG-DRY	<0.193	0.760	<0.251	<0.259	1.51	<0.281	<0.243	0.771	<0.268	<0.247
CHROMIUM	MG/KG-DRY	<0.329	2.45	1.46	2.26	5.51	1.41	2.07	3.29	2.29	3.07
LEAD	MG/KG	<0.14	112	23.3	2.79	237	6.78	3.36	103	6.14	3.43
MERCURY	MG/KG-DRY	<0.062	0.165	<0.099	<0.080	0.161	<0.103	0.235	<0.101	<0.098	<0.087

Note:
All samples analyzed for petroleum hydrocarbons, metals, VOCs, BNAs, PCBs, pesticides, and herbicides.
Table lists only those parameters found above minimum detection limits.

TABLE 4-16 (Page 2 of 2)
FORT BLISS RFI
SWMU #45 - STORMWATER IMPOUNDMENT AREA
SOIL BORINGS

SAMPLE ID			S45-B4-A	S45-B4-B	S45-B4-DP	S45-B4-C
DEPTH			0-0.5 FT	5-6.5 FT	5-6.5 FT	10-11.5 FT
PARAMETER	UNITS	DETECTION LIMIT				
DATE			06/08/90	06/08/90	06/08/90	06/08/90
BIS(2-ETHYLHEXYL) PHTHALATE	UG/KG-DRY	<140	980	<160	<160	<160
CHLORDANE	UG/KG-DRY	<5.08	77.8	<5.72	<5.60	<5.60
DDD,PP'	UG/KG-DRY	<0.501	9.83	<1.14	<1.12	<1.12
DDE,PP'	UG/KG-DRY	<0.514	23.3	<1.14	<1.12	1.12
DDT,PP'	UG/KG-DRY	<0.514	9.42	<1.14	<1.12	2.19
HEPTACHLOR	UG/KG-DRY	<0.501	<1.05	1.49	1.47	1.54
PETROLEUM HYDROCARBONS	UG/G-DRY	<26	717	<31.1	<30.1	<30.2
ARSENIC	MG/KG-DRY	<0.023	0.164	0.141	0.113	0.101
BARIUM	MG/KG-DRY	<0.031	232	175	291	357
CADMIUM	MG/KG-DRY	<0.193	1.46	<0.264	<0.279	0.231
CHROMIUM	MG/KG-DRY	<0.329	5.08	<0.423	<0.446	<0.370
LEAD	MG/KG	<0.14	171	8.01	10.9	6.02
MERCURY	MG/KG-DRY	<0.062	0.141	<0.094	<0.081	<0.095

Note:
All samples analyzed for petroleum hydrocarbons, metals, VOCs, BNAs, PCBs, pesticides, and herbicides.
Table lists only those parameters found above minimum detection limits.

TABLE 4-17
FORT BLISS RFI
SWMU #50 - PESTICIDE STORAGE AND MIXING AREA
SOIL BORINGS

SAMPLE ID			S50-B1-A	S50-B1-B	S50-B1-C	S50-B2-A	S50-B2-B	S50-B2-C	S50-B3-A	S50-B3-B	S50-B3-C	S50-B-DP
DEPTH			1-3 FT	3-5 FT	8-10 FT	1-3 FT	3-5 FT	8-10 FT	1-3 FT	3-5 FT	8-10 FT	8-10 FT
PARAMETER	UNITS	DETECTION LIMIT										
DATE			06/07/90	06/07/90	06/07/90	06/07/90	06/07/90	06/07/90	06/07/90	06/07/90	06/07/90	06/07/90
BHC,A	UG/KG-DRY	<0.902	<1.73	<1.85	<1.54	<1.66	<1.69	<1.58	<1.62	<1.79	<1.52	<1.54
CHLORDANE	UG/KG-DRY	<5.08	1110*	103	<5.14	289	<5.64	15.6	18.5	<5.98	<5.08	<5.15
DDE,PP'	UG/KG-DRY	<0.514	<1.15	2.33	<1.03	<1.11	<1.13	<1.06	3.09	<1.20	<1.02	<1.03
DDT,PP'	UG/KG-DRY	<0.514	43.8	8.15	1.77	<1.11	3.85	2.14	16.3	2.89	4.10	<1.03
HEPTACHLOR	UG/KG-DRY	<0.501	<1.15	<1.23	<1.03	<1.11	<1.13	<1.06	<1.08	<1.20	<1.02	<1.03
DIAZINON	UG/KG-DRY	<50.1	<57.6	<61.5	<51.4	570	<56.4	<52.8	<54.2	<59.8	<50.8	<51.5

Note:
All samples analyzed for pesticides and herbicides.
Table lists only those parameters found above minimum detection limits.
* - Exceeds recommended action level.

adjacent to Building 60-36 (S50-S0-4) and adjacent to Building 60-276 (S50-S0-5). DDT was detected above the recommended action level in the duplicate sample collected just north of Building 60-276.

4.9.2 SUBSURFACE SOIL BORINGS

Three soil borings were drilled and completed to 10 ft at this SWMU. Two of the borings were drilled adjacent to and just east of the pesticide buildings, the third boring was completed to the west of the buildings in the adjacent yard (Figure 3-13). Samples were collected from the 1-3 ft, 3-5 ft and 8-10 ft intervals in each borehole. The analytical results are presented in Table 4-18. Although chlordane, DDE, DDT and diazinon were detected in at least one of the subsurface soil samples, only chlordane was identified above the action level of 500 ug/kg in the 1-3 ft interval of boring, S50-B1. This result is consistent with the fact that this pesticide was identified in the surface soil sample at this same location.

4.10 SWMU #63, HERBICIDE STORAGE BUILDING NO. 11160

SWMU #63 is located north of Fred Wilson Road (Figure 3-4) and has been used for the storage of more than 25 different herbicides, including 2,4-D. The strategy at this SWMU included the sampling of the walls, floors and soils beneath the building.

4.10.1 SURFACE SOILS

Four surface soil samples (S63-SO-1 through S63-SO-4) were collected from stained areas in the crawl space beneath the building. Two additional soil samples were collected from stained areas in the crawl spaces located beneath the loading docks. All of the samples were collected from the 0-6 in interval and analyzed for pesticides, herbicides and dioxins. Table 4-19 presents the results of the analyses conducted for the pesticides and herbicides. The results of the dioxin sampling are presented in Table 4-20. The results indicate that nine

TABLE 4-18
FORT BLISS RFI
SWMU #50 - PESTICIDE STORAGE AND MIXING AREA
SURFACE SOILS

SAMPLE ID			S50-SO-1	S50-SO-2	S50-SO-3	S50-SO-4	S50-SO-5	S50-SO-6	S50-SO-DP
DEPTH			0-6 IN	0-6 IN	0-6 IN	0-6 IN	0-6 IN	0-6 IN	0-6 IN
PARAMETER	UNITS	DETECTION LIMIT							
DATE			05/15/90	05/15/90	05/15/90	05/15/90	05/15/90	05/15/90	05/15/90
BHC,A	UG/KG-DRY	<0.902	1.43	<0.925	<0.934	<0.951	<0.962	<0.989	<0.984
CHLORDANE	UG/KG-DRY	<5.08	<21.1	<21.0	130	6520*	517*	218	353
DDD,PP'	UG/KG-DRY	<0.501	<0.516	<0.514	<0.519	<0.529	<0.534	210	428
DDE,PP'	UG/KG-DRY	<0.514	3.50	<0.514	33	109	13.9	95.2	287
DDT,PP'	UG/KG-DRY	<0.514	27.1	<0.514	140	209	90	1980	3960*
ENDRIN	UG/KG-DRY	<0.501	<0.516	<0.514	<0.519	<0.529	<0.534	11.5	15.4
HEPTACHLOR	UG/KG-DRY	<0.501	<0.516	0.813	<0.519	12.4	<0.534	<0.549	<0.547
CHLOROPYRIFOS	UG/KG-DRY	<50.1	<51.6	<51.4	<51.9	30000+	<53.4	<54.9	<54.7
DIAZINON	UG/KG-DRY	<50.1	<51.6	<51.4	<51.9	103	9540	<54.9	<54.7
MALATHION	UG/KG-DRY	<50.1	<51.6	<51.4	<51.9	150	<53.4	<54.9	<54.7

Note:
All samples analyzed for pesticides and herbicides.
Table lists only those parameters found above minimum detection limits.
+ Estimated value
* - Exceeds recommended action level.

TABLE 4-19
FORT BLISS RFI
SWMU #63 - HERBICIDE STORAGE
SURFACE SOILS

SAMPLE ID			S63-SO-1	S63-SO-DP	S63-SO-2	S63-SO-3	S63-SO-4	S63-SO-5	S63-SO-6
DEPTH			0-6 IN	0-6 IN	0-6 IN	0-6 IN	0-6 IN	0-6 IN	0-6 IN
PARAMETER	UNITS	DETECTION LIMIT							
DATE			05/14/90	05/14/90	05/14/90	05/14/90	05/14/90	05/14/90	05/14/90
ALDRIN	UG/KG-DRY	<0.501	<0.506	<0.505	<0.509	<0.501	<0.504	10.9	<0.505
BHC,A	UG/KG-DRY	<0.902	<0.910	<0.910	<0.915	<0.902	1.63	<0.929	1.66
CHLORDANE	UG/KG-DRY	<5.08	606*	380	<20.7	<20.5	<20.6	642*	510*
DDE,PP'	UG/KG-DRY	<0.514	619	343	26.7	104	60.2	306	349
DDT,PP'	UG/KG-DRY	<0.514	281	182	197	589	67	2000*	1250
DIELDRIN	UG/KG-DRY	<0.007	<0.506	<0.505	<0.509	<0.501	<0.504	43.9*	<0.505
ENDOSULFAN SULFATE	UG/KG-DRY	<0.501	2.63	<5.05	<5.09	<5.01	<5.04	<5.16	<0.505
HEPTACHLOR	UG/KG-DRY	<0.501	<5.06	<0.505	<5.09	<0.501	1.07	1.00	<0.505
HEPTACHLOR EPOXIDE	UG/KG-DRY	<0.501	<0.506	<0.505	<0.509	<0.501	4.03	5.42	<0.505
2,4-D	UG/KG-DRY	<5.00	40200	24700	14100	<5.00	72.5	<5.16	66.7

Note:
All samples analyzed for pesticides and herbicides.
Table lists only those parameters found above minimum detection limits.
* Equals or exceeds recommended action level.

TABLE 4-20
FORT BLISS RFI
SWMU #63 - HERBICIDE STORAGE
SURFACE SOILS

SAMPLE ID		S63-SO-1	S63-SO-2	S63-SO-3	S63-SO-4	S63-SO-5	S63-SO-6	S63-SO-7
IT SAMPLE ID		BB2409	BB2410	BB2411	BB2412	B32413	BB2414	BB2415
DEPTH		0-6 IN	0-6 IN	0-6 IN	0-6 IN	0-6 IN	0-6 IN	0-6 IN
PARAMETER	UNITS							
DATE		05/14/90	05/14/90	05/14/90	05/14/90	05/14/90	05/14/90	05/14/90
DIOXINS								
TOTAL TCDD	PG/G	ND (6.1)	ND (3.5)	ND (1.5)	ND (3.2)	ND (5.8)	ND (2.2)	ND (1.7)
TOTAL PeCDD	PG/G	ND (0.33)	ND (10.4)	ND (1.6)	ND (1.2)	18.2	ND (1.1)	2.7
TOTAL HxCDD	PG/G	20.7	30.4	60.5	22.8	718	90.1	142
TOTAL HpCDD	PG/G	242	605	839	223	5770 +	967	1410 +
TOTAL OCDD	PG/G	916 +	3070 +	5490 +	1140 +	26500 +	6210 +	8800 +
FURANS								
TOTAL TCDF	PG/G	ND (3.7)	5.0 ++	56.4 ++	ND (1.4)	142 ++	222 ++	247 ++
TOTAL PeCDF	PG/G	15.5	25.1 ++	143	15.2 ++	546	306 ++	411 ++
TOTAL HxCDF	PG/G	36.3	259 ++	449 ++	40.7 ++	1960 +	491 ++	854 ++
TOTAL HpCDF	PG/G	55	820	772 ++	80.9	5190 +	554 ++	1140 +,++
TOTAL OCDF	PG/G	45.8 +	1050	650	53.2	5770 +	199	764

Note:
Concentration units (PG/G) = parts per trillion
Detection limits listed in parenthesis.
+ Estimated value
++ Possible interference

organochlorine pesticides and one chlorinated herbicide were detected in at least one of the soil samples. The sample collected from the crawl space beneath the north loading dock (S63-SO-5) exceeded the action levels for chlordane, DDT and dieldrin. Other samples exceeding action levels were collected from the crawl space beneath the south loading dock (S63-SO-6) and from the crawl space directly beneath the building (S63-SO-1).

The only action level readily available for dioxins and furans is for the dioxin 2,3,7,8-TCDD which has been calculated from the formula for class B2 carcinogens contained in the Federal Register dated July 27, 1990. Table 4-1 lists the action level as 4.6×10^{-6} mg/kg, which is equivalent to 4.6 parts per trillion. None of the soil samples collected from the herbicide building contained quantifiable levels of 2,3,7,8-TCDD.

4.10.2 WIPE SAMPLES

Five wipe samples were collected from construction materials inside the herbicide building. The samples were obtained with a glass fiber filter, presoaked with methylene chloride. Samples WP-1 and WP-5 were collected from the walls of the herbicide building, samples WP-2, WP-3 and WP-4 were collected from the floor of the storage building. The five wipe samples were analyzed for herbicides, pesticides and dioxins. Table 4-21 presents the results for the pesticide and herbicide analyses, Table 4-22 the dioxin analyses. Ten organochlorine pesticides, three chlorinated herbicides, and two organophosphorus pesticides were detected in the wipe samples. The majority of compounds were identified in sample S63-WP-2, S63-WP-3 and S63-WP-4, the floor samples. Both dioxin and furan isomers were detected in the wipe samples; however, TCDD was not detected in any of the samples.

TABLE 4-21
FORT BLISS RFI
SWMU #63 - HERBICIDE STORAGE
WIPE SAMPLES

SAMPLE ID			S63-WP-1	S63-WP-2	S63-WP-3	S63-WP-4	S63-WP-5	S63-WP-BK
PARAMETER	UNITS	DETECTION LIMIT						
DATE			05/14/90	05/14/90	05/14/90	05/14/90	05/14/90	05/14/90
ALDRIN	UG/CM2	<0.00003	<0.00003	<0.00003	0.00110	0.00050	<0.00003	<0.00003
BHC,B	UG/CM2	<0.00003	<0.00003	<0.00003	<0.00003	0.00020	<0.00003	<0.00003
BHC,G (LINDANE)	UG/CM2	<0.00004	<0.00004	0.00230	0.00410	0.00090	0.00050	<0.00004
CHLORDANE	UG/CM2	<0.001	<0.001	0.049	<0.001	0.022	<0.001	<0.001
DDE,PP'	UG/CM2	<0.00003	0.00040	0.0153	<0.00003	0.166	0.00090	<0.00003
DDT,PP'	UG/CM2	<0.00003	0.00450	0.155	<0.00250	0.273	0.0103	<0.00003
DIELDRIN	UG/CM2	<0.00003	<0.00003	0.00880	0.0744	<0.00003	0.00040	<0.00003
ENDRIN	UG/CM2	<0.00003	0.00010	<0.00003	0.0543	<0.00003	<0.00003	<0.00003
HEPTACHLOR	UG/CM2	<0.00003	<0.00003	<0.00003	0.00090	<0.00003	0.00010	<0.00003
HEPTACHLOR EPOXIDE	UG/CM2	<0.00002	0.00002	0.00040	<0.00003	0.00020	<0.00003	<0.00003
2,4-D	UG/CM2	<0.0005	0.01	4.59	36.5	11.4	0.02	<0.0005
2,4,5-TP(SILVEX)	UG/CM2	<0.0005	<0.0005	0.004	0.002	0.003	<0.0005	<0.0005
2,4,5-T	UG/CM2	<0.0005	<0.0005	0.03	0.4	<0.05	<0.0005	<0.0005
DIAZINON	UG/CM2	<0.25	<0.25	2.59	<0.25	<0.25	<0.25	<0.25
ETY'PARATHION	UG/CM2	<0.25	<0.25	<1.3	1.4	<0.25	<0.25	<0.25

Note:
All samples analyzed for pesticides and herbicides.
Table lists only those parameters found above minimum detection limits.

TABLE 4-22
FORT BLISS RFI
SWMU #63 - HERBICIDE STORAGE
WIPE SAMPLES

SAMPLE ID		S63-WP-1	S63-WP-2	S63-WP-3	S63-WP-4	S63-WP-5	S63-WP-BK
IT SAMPLE ID		BB2416	BB2417	BB2418	BB2419	BB2420	BLK1711
PARAMETER	UNITS						
DATE		05/14/90	05/14/90	05/14/90	05/14/90	05/14/90	05/14/90
DIOXINS							
TOTAL TCDD	PG/G	ND (40.3)	ND (61)	ND (109)	ND (40.3)	ND (21.5)	ND (8.2)
TOTAL PeCDD	PG/G	ND (8.9)	ND (6.8)	ND (23.8)	ND (24.2)	ND (40.4)	ND (15.2)
TOTAL HxCDD	PG/G	ND (5.9)	79.7	18.7	34.5	ND (13.9)	ND (6.5)
TOTAL HpCDD	PG/G	40.8	729	616	445	77.3	ND (3.2)
TOTAL OCDD	PG/G	282	6830	5310	3830	708	ND (23.5)
FURANS							
TOTAL TCDF	PG/G	ND (29.1)	314	ND (36.3)	132	16.4	ND (10.6)
TOTAL PeCDF	PG/G	8.4	365	84.2	82.7	ND (16)	ND (19.8)
TOTAL HxCDF	PG/G	ND (13.8)	298	227	117	ND (20.8)	ND (14.3)
TOTAL HpCDF	PG/G	ND (19.6)	448	338	84.8	ND (24.7)	ND (21.9)
TOTAL OCDF	PG/G	18.5	445	312	168	ND (27.4)	ND (4.3)

Note:
Concentration units (PG/G) = parts per trillion
Detection limits listed in parenthesis.

4.10.3 WOOD SAMPLES

Four wood samples were obtained within the herbicide storage room. All of the wood samples were collected at the same locations as the wipe sample locations. Thus for example, sample S63-WD-1 was collected from the wall where wipe sample S63-WP-1 was collected. Likewise, wood sample S63-WD-3 was collected from the same location on the floor as wipe sample S63-WP-3. The four wood samples were analyzed for pesticides, herbicides and dioxins. Tables 4-23 and 4-24 present the results for all of the analyses.

Wood sample S63-WD-1 contained both DDE and DDT. These two constituents were also detected in the wipe sample from the same location. The wood sample from location #2 (floor sample) contained more pesticides than the wipe sample. The wood sample from location #4 on the floor contained the most constituents. These results indicate that residues from the pesticides and herbicides stored within this building have saturated the structure of the building itself.

TABLE 4-23
FORT BLISS RFI
SWMU #63 - HERBICIDE STORAGE
WOOD SAMPLES

SAMPLE ID PARAMETER	UNITS	DETECTION LIMIT	S63-WD-1	S63-WD-2	S63-WD-3	S63-WD-4
DATE			05/14/90	05/14/90	05/14/90	05/14/90
BHC,G (LINDANE)	UG/KG-DRY	<7.24	<7.24	614	617	240
CHLORDANE	UG/KG-DRY	<211	<211	39300	<213	2660
DDE,PP'	UG/KG-DRY	<5.23	50.5	3420	<5.23	718
DDT,PP'	UG/KG-DRY	<5.17	621	19100	880	1970
DIELDRIN	UG/KG-DRY	<5.17	<5.17	<5.17	<5.23	485
ENDRIN	UG/KG-DRY	<5.17	<5.17	<5.17	376	<5.51
HEPTACHLOR	UG/KG-DRY	<5.17	<5.17	191	119	65.6
2,4-D	UG/KG-DRY	<26.7	<26.7	9720	25500	397
2,4,5-T	UG/KG-DRY	<28.6	<28.6	74.2	65.5	<29.5

Note:
All samples analyzed for pesticides and herbicides.
Table lists only those parameters found above minimum detection limits.

TABLE 4-24
FORT BLISS RFI
SWMU #63 - HERBICIDE STORAGE
WOOD SAMPLES

SAMPLE ID		S63-WD-1	S63-WD-2	S63-WD-3	S63-WD-4
IT SAMPLE ID		BB2422	BB2423R	BB2424	BB2425
PARAMETER	UNITS				
DATE		05/14/90	05/14/90	05/14/90	05/14/90
DIOXINS					
TOTAL TCDD	PG/G	ND (7.4)	ND (739)	ND (10.2)	43.5
TOTAL PeCDD	PG/G	ND (4.4)	ND (187)	ND (82.5)	65.9
TOTAL HxCDD	PG/G	ND (2.2)	ND (446)	ND (45.1)	705
TOTAL HpCDD	PG/G	6.2	NR	345 +	5020 +
TOTAL OCDD	PG/G	10.6	NR	518	12800 +
FURANS					
TOTAL TCDF	PG/G	89.9 ++	ND (403)	28.1	ND (10.7)
TOTAL PeCDF	PG/G	47 ++	633 ++	108	55.5 ++
TOTAL HxCDF	PG/G	13.9 ++	884	155	93.3 ++
TOTAL HpCDF	PG/G	ND (2.5)	2410	170	28.3
TOTAL OCDF	PG/G	ND (2.1)	NR	60.2	168

Note:
Concentration units (PG/G) = parts per trillion
Detection limits listed in parenthesis.
+ Estimated value
++ Possible interference

5.0 CONCLUSIONS

On July 5, 1990, the US Environmental Protection Agency proposed regulations implementing the Resource Conservation and Recovery Act (RCRA) Corrective Action process. These proposed regulations specifically apply to releases from solid waste management units (SWMUs) at facilities seeking a RCRA permit.

Briefly, the four principal steps of the Corrective Action process are:

- RCRA Facility Assessment (RFA) - study undertaken to locate SWMUs,
- RCRA Facility Investigation (RFI) - sampling investigation to determine the nature and extent of contamination,
- Corrective Measure Study (CMS) - engineering evaluation to recommend the optimal corrective measures at each SWMU, and
- Corrective Measures Implementation (CMI) - design/cleanup.

The Fort Bliss facility has now completed the first and second steps of the RCRA Corrective Action process.

5.1 SWMUs BELOW ACTION LEVELS

The analytical results of the field investigation conducted in May/June 1990 and October 1991 indicate that at the following SWMUs, all of the constituents analyzed for were below action levels:

- SWMU #1, Sanitary Landfill No. 1 (Active), Large and Small Grease Pits,
- SWMU #4, Oil Pits at Sanitary Landfill No. 2 (Closed), Large Oil Pit (borings around perimeter of pit only),
- SWMU #15, Rubble Dump Spill Site, and
- SWMU #45, Stormwater Impoundment Area.

At SWMU #15, Rubble Dump Spill Site, petroleum hydrocarbons were detected in five of the soil samples at concentrations ranging from 14,100 to 47,700 parts per million (ppm). There is no action level specific to petroleum hydrocarbons since it is actually a mixture of several compounds. Its presence at this location should not be ignored.

Petroleum hydrocarbons were also detected in all three areas of SWMU #21, McGregor Range Fire Fighting Training Area. The presence of this parameter in these areas is not surprising since fuel oils and waste oils had been burned here. The concentrations range from 578-21,000 ppm in the fixed-wing burn area, 30-6,020 ppm in the vehicle burn area, and 61-61,100 ppm in the drum storage area.

5.2 SWMUs ABOVE ACTION LEVELS

The data generated during this RFI indicate that hazardous constituents above recommended action levels have been detected at the following SWMUs:

- SWMU #4, Oil Pits at Sanitary Landfill No. 2 (Closed) - Small Oil Pit and Oil in Large Oil Pit,
- SWMU #30, Hazardous Waste and PCB Storage Facility,
- SWMU #31, Old Fire Fighting Training Area,
- SWMU #39, NCO Academy Oxidation Lagoon,
- SWMU #50, Pesticide Storage and Mixing Area, and
- SWMU #63, Herbicide Storage.

The extent of contamination for each of the SWMUs listed above will be discussed in the following sections.

5.2.1 SWMU #4, OIL PITS AT SANITARY LANDFILL NO. 2 (CLOSED)

Two organic compounds and PCB-1254 were detected above recommended action levels in soil samples collected from the 2.5 ft interval at this SWMU. Although the horizontal extent appears to be adequately defined, the vertical

extent of organic contamination has not been fully determined. It is also important to note that all of the surface and subsurface soil samples contained high concentrations of petroleum hydrocarbons. Since this is actually a mixture of constituents, there is no established action level for this parameter.

The oil horizon in the large oil pit contained PCB-1232 above the recommended action level. As noted in previous sections of this report, the oil layer was much thicker than anticipated, and as a result, soils below the oil layer could not be sampled during the RFI field effort. Since the small pit contained organics above action levels, it is possible that the soils beneath the oil layer in the large pit may be contaminated as well.

5.2.2 SWMU #30, HAZARDOUS WASTE AND PCB STORAGE FACILITY

PCB-1260 was detected above the action level in the surface soil sample collected from the stained area just south of the storage building. The vertical extent of this compound has not been determined; the horizontal extent is probably defined by the limits of the stain.

5.2.3 SWMU #31, OLD FIRE FIGHTING TRAINING AREA

PCB-1260 was detected above the action level in the surface soil sample collected at Trench 1. The compound was not detected at any other location sampled within this SWMU. It is also important to note that soil samples in this area contained high concentrations of lead and/or petroleum hydrocarbons. There is currently no recommended action level for lead. There is also no recommended action level for petroleum hydrocarbons since this is actually a mixture of constituents.

5.2.4 SWMU #39, NCO ACADEMY OXIDATION LAGOON

The only exceedance of an action level at this SWMU was the pesticide aldrin, which was detected in the surface soil sample of the northern borehole in the NE spill area. Up until the time of the May/June field investigation, it appeared that

the three major spill areas at this SWMU had become very weathered. Anything that might have been spilled in the past had probably dissipated due to evaporation and erosion. Of particular concern at this SWMU however, is the possibility of additional dumping of wastes into the lagoon. During the May site visit, ESE representatives observed a large tank truck emptying its contents onto the side of the lagoon, near the northwest spill area. The incident was reported to the Fort Bliss Environmental Office. It is advised that this area be monitored in the future since it seems to be a good location for unauthorized waste disposal.

5.2.5 SWMU #50, PESTICIDE STORAGE AND MIXING AREA

Chlordane and DDT were both identified above action levels in the soils collected from the front of each of the storage buildings. Chlordane was also detected above the action level in the borehole drilled in front of Building 6036 at a depth of 3 ft. The concentration of chlordane in the sample collected at the 5 ft depth in this same borehole was below the action level, thus the contamination appears to be confined to the upper 3 ft. Good housekeeping practices should be strictly adhered to in order to prevent further contamination of surficial soils.

5.2.6 SWMU #63, HERBICIDE STORAGE

Chlordane, DDT, and dieldrin were detected above action levels in the soil samples collected from the crawl spaces beneath the storage building. The presence of these compounds in the soils could be due to sloppy handling of the pesticide containers being stored in the building. The wipe and wood samples collected from this SWMU also contained quantifiable levels of some of these herbicides. The analytical data suggests that portions of the walls and floor of this building have become contaminated. The obvious concern at this SWMU is for the workers who are potentially exposed to these compounds each time they enter the building. Should a decision be made to dismantle this building, it should be noted that the presence of contaminants in the wood will limit the possible disposal options of the construction materials.

6.0 ADDITIONAL RFI INVESTIGATIONS NOT INVOLVING ENVIRONMENTAL SAMPLING

6.1 EVALUATION OF PAST ENVIRONMENTAL REPORTS, SWMU #32, BIGGS AIRFIELD FIRE FIGHTING TRAINING AREA

This Fort Bliss Fire Training Area is located approximately three miles north of El Paso on the Fort Bliss Military Reservation (west of the Biggs Airfield runway). Fire fighting training was conducted at the training area from 1980-1987. The fire training area includes four sites covering approximately 27.5 acres.

In December 1988, Law Environmental, Inc. submitted a Final Closure Plan for this Fire Fighting Training Area to the U.S. Army Corps of Engineers, Kansas City District. The closure was to be accomplished in the following manner:

- Phase I - Drum removal
- Phase II - Debris removal
- Phase III - Contaminated soil removal
- Phase IV - Site Restoration

According to Fort Bliss Environmental Office personnel, Phases I and II have been completed and Phase III has been initiated. Empty drums were removed from the premises in 1987 and 1988. Drums containing solvents were removed in 1988. Debris removal was accomplished in 1989. In September 1990, treatability studies were begun on the contaminated soils in an attempt to determine the most efficient and cost effective method of onsite soil treatment. The actual treatment process is anticipated to commence during the summer of 1991, optimizing weather conditions.

Based on the fact that this site is currently undergoing closure, no additional work is warranted at this time.

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